RAILROAD GAZETTE

FRIDAY, MARCH 8.

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Contributions.

The Cost of the Associations.

TO THE EDITOR OF THE RAILROAD GAZETTE:

There is little doubt that the framers of the Inter-state Commerce act intended by the anti pooling clause to prohibit associations for maintaining rates and regulating traffic, and when the disposition of Congress is considered, it is questionable whether such an amendment may not yet be tacked on. An illustration of this disposition is found in the resolution introduced into the House of Representatives immediately after the publication of the proceedings of the first meeting of the proposed Inter-state Commerce Railway Association, looking to an inquiry into the objects of the proposed association, and more particularly making inquiry as to whether such an agreement was not a practical violation of the Inter-state Commerce act. Nevertheless, while the act has diminished the usefulness of the railroad associations it has not lessened their numbers.

There are at present 53 regularly organized associations, commissions, conventions and committees of railroad officers having for their ostensible objects varied aims, from the maintenance of rates to the expeditious delivery of letters. When the Inter-state law went into effect there were about the same number. These associations may be classified as follows:

1. Those having the regulation of traffic in view, such as the Trunk Line Commission, Central Traffic Association, Transcontinental Association, etc., numbering 29 in all.

2. General associations for the purpose of exchange of views, making arrangements for through time cards, exchange of business, classifications and other matters requiring concerted action. This class includes such organizations as the National Association of General Passenger and Ticket Agents, Association of General Freight Agents of Canada, General Time Convention, etc., in all 11 organizations.

3. Local committees or associations for the purpose of arranging for traffic of a competitive nature at points where two or more lines enter into competition. In this class would come such organizations as the Boston Passenger Committee, New Orleans Freight Traffic Association and Chicago Freight Committee, in all 10.

4. Local associations for the expeditious and economical collecting and distributing of railroad mail. As yet there are but three of these exchanges organized, namely, the Chicago Railway Exchange, Cincinnati Railway Mail Exchange and the Railway Mail Exchange of St. Louis.

All of these associations are, in a greater or less degree, useful and necessary, but the inadequacy of those of class 1 to accomplish the end desired is obvious, and the burden upon the railroads is great. That the associations for the regulation of traffic and rates have struggled along for months in practical uselessness is well known, but the extent to which they are a burden upon the revenues of the railroads, and a tax upon the time of railroad officers, is not so well known. The following estimate of the cost of these associations is based upon the actual figures for the year 1888, of one of the most prominent organizations:

There are connected with the 29 associations included in class 1, 73 titled officers, at an average salary of $6,377 per year. The average number of clerks per official is five; the average salary $1,080 per year; rent and other office expense per official, $2,400 per year; traveling and other outside expense per official, $1,200 per year; average printing bill per official (for these organizations are great believers in letting their light shine), $1,800 per year, which, summarized, gives us for direct expenses:

73 officers at $6,377	$465,521
365 clerks at $1,080	393,200
Rent and office expenses	146,000
Traveling and outside expenses	187,600
Printing	131,400
Total	$1,223,721

In addition to this the expenses of representatives in attending meetings must be taken into consideration. Taking again the association our previous figures are based on, we find that the average attendance at monthly meetings during 1888 was 24. This will give the following, on the supposition that the average salary of representatives was $8 per day, equivalent to $3,000 per year, and that their traveling expenses were $7 per day. Allowing for time consumed en route to and from meetings, we find that 2½ days per month, or 30 days per year, was spent by 24 representatives of different lines, at an expense of $15 per day, which gives us for the 29 associations:

Previously stated	$1,223,721
Expense of attendance	313,200
Total	$1,536,921

The fact that the presidents of the Western systems, lines members of the Trunk Line Association and those of the Central Traffic Association, are striving to arrive at some new plan that will accomplish what these associations are supposed to have done is an admission that they have failed in the past, and that this expense of over a million and a half dollars for 1888 was without satisfactory return to the companies, so far as the first object of their creation, the maintenance of rates, is concerned. There is no question that some benefits of a minor nature have been derived from these associations. In many cases agreements have been made and kept, rates have been agreed upon and maintained, details have been arranged and many other benefits have come from personal acquaintance and from the interchange of views; but it is admitted that the gain has not been commensurate with the expenditure of time and money. B.

How Rails and Splices Break.

TO THE EDITOR OF THE RAILROAD GAZETTE:

The present season has been a favorable one for track, particularly stone-ballasted track. We have had very little snow, and hardly enough frost at any time to prevent track work of any kind where necessary. The track force, however, has been cut down to about a foreman and two men on an average section. My section is at the end of a division, and includes five miles of main track and an engine house and freight yard, with about six miles of side tracks and 40 switches. I am allowed four men. We go over the section once a day to look out for broken rails, etc. Most of one man's time is taken to clean up cinders and the like in the yard, make repairs to switches and do such work as can be done by one man. Cleaning out culverts, straightening water courses, cutting brush, trimming hedge fences and changing iron in side tracks takes up most of our time at this season of the year.

We have had very few broken rails this season. I found one the other day in the outer rail of a curve. It had been in the track 14 years and the inside of the head of the rail was considerably ground off by the flanges of the wheels. The break was through the head and neck of rail, passing through both bolt holes, so that a piece of the head of the rail, about a foot long, could be lifted out, exposing the top of the fish-plates. I sent one man north with a flag and torpedoes, and went back for a rail. When I returned, I found a freight train from the north waiting, and behind it the fast express. We unloaded the rail beside the broken one, and found it was an inch or so too long, and as there seemed to be very little or no space for expansion at the joints near, it was a question how to fix it with the least delay to the trains that were waiting. As long as the broken pieces staid in place, the wheels would pass over all right, and if it had been on straight track, or in the inner rail of curve, they would not have hesitated; but being in the outer rail, with all wheels hugging tight against it, the freight men would not risk it, for if it should get out of place it would form a lip at the square end of the other rail on which the flanges of wheels would catch, mount the rail and go off the track. If it had been the passenger train that was next to it, they would have gone over it slowly, as they could have stopped in a few feet, if necessary, but the track is on a down grade to the south, and a freight train in motion could not be stopped soon enough to prevent serious trouble if anything went wrong. I prevented further delay by spiking the rail I had brought on the inside of the inner rail of the curve, to act as a guard rail, and even if the broken piece then got out of place, the wheels could not get off the track. After the trains passed I changed the rail by closing the expansion in enough joints to allow the bar to go in. A break similar to this caused a bad wreck on our road a year or so ago. A piece at the end of a rail broke out, and the wheels, pounding over the break, broke piece after piece off the end of the next rail, until several feet of the rail was broken out of track. It was on straight track, and most of the train passed over it, but a truck in the rear end of the train caught and wrecked several cars, throwing the caboose on its side down an embankment, killing one man and injuring others. The broken rail mentioned, that I took out of track, had a joint tie and good shoulder ties, and track was well ballasted with stone and was in good surface. It was a frosty morning, and it may have been what I have heard blacksmiths call a jingling blow that caused the break.

Our roadmaster says that over 80 per cent. of rails that broke on his work last year, broke within 12 in. of the end of the rail. Over half of the rails that break are cracked or split, up and down through the middle of neck and head of rail, at the end of the bar. Almost always, the inside portion will break through the head about 4 in. from end, and down through or near the bolt hole and out in the neck of the rail, the piece that comes out being three-cornered. These cracks extend back sometimes, so that we have to cut off a second piece before we can get a rail that can be used again, and I have known a rail to be split in this way for half its length. I have also known rails to have one-half the head break out in the middle of the rail, caused by these cracks, the piece varying from 6 in. to 1 ft. or more in length. It seems to be a fault in rolling them, and the crack is largest in the middle of the head of the rail, and very often cannot be detected on the top of the rail until it becomes worn down.

Of rails that break, probably one-half at least will be at the end of the rail, caused by being split or defective; one-fourth at the first bolt hole, *i. e.*, the one next to end of bar; three-twentieths at second bolt hole, and one tenth at points other than at end of rail. Of those that break at first bolt hole, some break through head and neck, allowing a triangular piece to come out, exposing the rail splices; others break through the head, neck and base, the broken piece being held in place by the joint fastenings. The breaks through both first and second holes are at an angle of about 45 deg., the piece that is broken off being longer on the top than on the base of the rail. The fact that no rails break vertically between bolt holes shows that drilling the rail weakens it particularly at the first bolt hole.

One can never tell which rails will break, for I have had good and apparently sound rails break, right over a tie that was on good stone ballast and in good surface, with no reason in the world for breaking that I could see; when at the same time there were battered and split rails in track that I had been watching closely, expecting them to break first, but which really lasted longer than other rails apparently good and sound. Our roadmaster says he was given new rail enough last fall to take out two or three miles of worn steel and with it replaced all split and defective rails on a certain portion of his work where there was an unusual amount of traffic, and that he considered that portion in as good condition as it is practicable to make steel rail that has been in use 15 years or more; and still they have just had a wreck there, out between stations, ditching six freight cars and a caboose. The train was north-bound and was the third to pass over the track within two hours, and the section men examined the track after the first train passed. The rail broke north of the joint, near the first bolt hole, and a piece of the rail must have come out, as the wheels broke out several pieces, one after the other, leaving the south rail uninjured.

Low joints are the cause of a great many of our broken fish-plates which have been in use from 12 to 15 years and have broken very fast in the last two or three years. They are the ordinary plate for 60-lb. steel as laid up to 1877. The joints go down and the plates bend and become set. When the joint is put up it is probably raised a little high to allow for settling. This up and down motion bends the plates back and forth and makes cracks or checks in the plate which afterward cause a break, the same as a wire is broken by bending back and forth. The break is almost always between the middle bolt holes, sometimes through one of the centre holes. The strains that bend the rail splices I think must come unevenly on the ends of the rails; that is, the strain is greater at some points near the end of the bar than others, and on account of the splice acting as a lever between head and base of rail the strains are brought to bear in different directions. There is also in winter another way that rails are subjected to unusual strains. When a joint gets low, the rail springs back after the load is removed, holding the tie suspended over its bed; now if the other ties next to the joint freeze solid, the strain on the rail at the joint, must be much more severe when the load comes on it, than if the other ties could settle or go down at the same time. These strains may have something to do with the large proportion of breaks that occur near the ends of the rails or may cause checks or flaws that afterward result in a break.

There is also another trouble that rail joints are subject to, which is caused by rails creeping. Where this trouble is experienced, there is a heavy strain on the bolts in the rail joint, and consequently on the rails at the bolt holes. If the rail splices are not punched so as to exactly correspond with the holes in the rail, the strain comes mostly on two of the bolts, instead of on the four bolts, as it should properly do. Take a portion of the track where the creeping of rails has taken up all of the slack or "expansion" at the joints and brought a strain on the bolts at all the joints, and consider how great the strain is in extreme cold weather when the additional strain, caused by rails contracting on account of temperature, is brought to bear. I have known plates to break, allowing the rails to run and leaving an opening of from 4 to 8 in. This frequently happens under such circumstances, and I know of an extreme case where a break of this kind left an opening of 14 in., which gives an idea of the unusual strain that is brought to bear. Under these circumstances, broken rail splices are as dangerous as broken rails, for few broken rails are more dangerous than an open joint of 6 in. or more.

The joint is certainly the weakest part of the rail and for safety as well as for smooth track the very best form of rail joint should be used. I noticed a good joint on a northern road last season; it had long angle bars reaching from one shoulder tie the other, thus having a bearing on three ties: the outside bar was reinforced, being very much thicker than the inside bar. A good deal depends on bolts being kept tight. We use Verona nut locks, of the pattern with a square section and they do very well if the ends can be kept out of holes in the rail splice, but are hardly strong enough. They should be made heavier, but of the same pattern as those with the square section, rather than of the pattern that has a rectangular section.

I notice that steel rails are being made much heavier than the old patterns, but what I have seen are not wearing as well; certainly very little is gained by an increase in weight, unless the quality can be kept to a standard.

TRACK FOREMAN.

Loading Heavy Articles.

ST. LOUIS, Feb. 20, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

A box vault lining and vault front, weighing 7,800 lbs., was loaded in a car. Among other freight in the car were four nests of wooden coffins. On opening the car the coffins were found damaged by impingement of the vault front which broke through the nest. No evidence shown of any attempt to secure the vault against motion of car. Claim has been paid, but I would like your opinion, in view of the slidometer tests at Burlington, of the probability or improbability of movement in the car of the vault front by reason of the shocks to which the car would be ordinarily subject.

S. D. WEBSTER.

[If the movement was caused by a single sudden stop like those made at Burlington, it would require that the speed just previous to the stop be very high, the rate depending upon the casing of the vault and the material and condition of the car floor. Theoretically it might be stated as from 25 to 70 miles an hour. It is not probable, however, that the movement was so caused, but rather by being gradually jolted on to its long home in the wooden coffins. Whether ordinary switching bumps average as high as 25 miles an hour in the latitude of St. Louis, we are not prepared to say. On an eastern road a recent damage claim had the speed noted upon it: "Register shows 70 miles an hour; if the limit of the register had been greater the train would undoubtedly have traveled faster." The collision in this case, however, was with the bottom of a ravine, and the theoretical friction between planed spruce and rough floor boards was violently eliminated from the problem. But if our correspondent is like most claim agents, he doubtless brought forward as little evidence on the question of speed as the loader did concerning the blocking of the vault front. The case noted is decidedly similar to the slidometer tests at Burlington, except as to the number of coffins—one Coffin (of Iowa) in the one case as against whole nests of them in the other. —EDITOR RAILROAD GAZETTE.]

Marking the Centre Line.

BOSTON, Feb. 27, 1889.

TO THE EDITOR OF THE RAILROAD GAZETTE:

Noticing a communication from E. F. J. in your issue of Feb. 22 in regard to some satisfactory way of marking the centre line of location of a railroad, I take it upon myself to send a reply, which you can use, or not, as you think proper.

It seems to me that the best way of fixing permanently the centre line is to set stones of granite, about 4 ft. long and 6 in. square, with one end dressed off reasonably flat, and a small hole drilled an inch deep in the centre. If a single track road, the top of the stone should not be above the grade of the ties. If a double track road, the top should be about 3 in. above the surface of the roadbed. These stones should be placed at the beginning and end of each curve on the line, and if the length of a tangent between any two curves is very great it might be advisable to set one or more stones on this line between those at the ends. Iron rods or pins are also used 2, 3 or 4 ft. long, as the case may be; but I should prefer the stones, as they are less liable to be disturbed by frost or other cause.

W. G. S. CHAMBERLAIN.

The St. George Disaster.

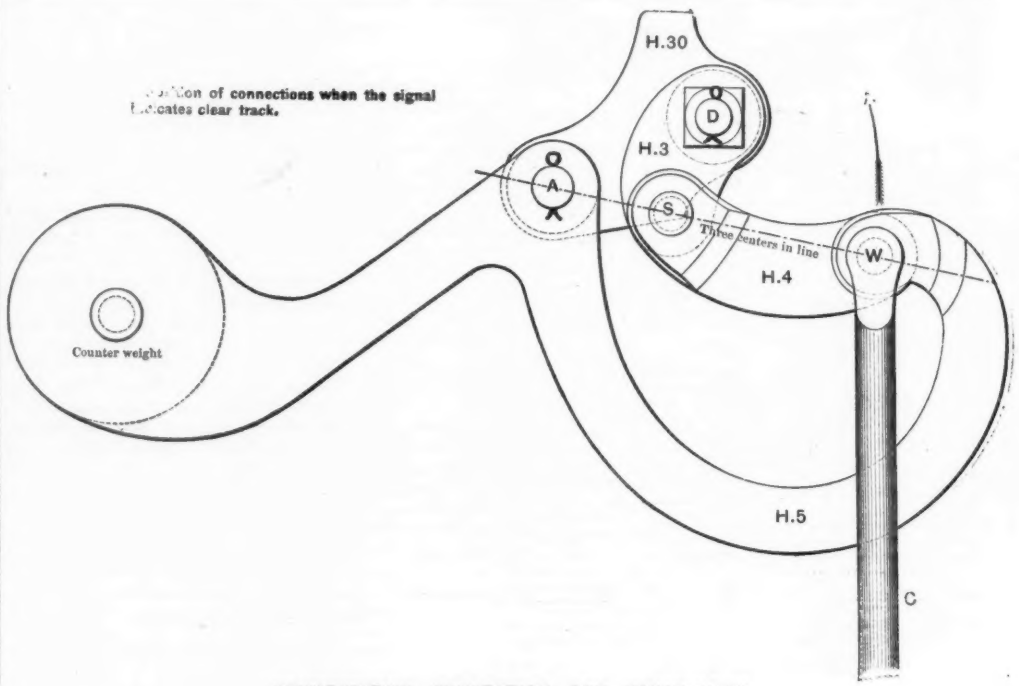
On Wednesday, Feb. 27, the east-bound St. Louis express over the Great Western division of the Grand Trunk road plunged through a bridge at St. George, Ont., 22 miles west of Hamilton, resulting in the death of 12 and the injury of 26 persons. The passengers in the dining car were thrown to one end with the furniture on top of them; the cooking range fell among the rest, but no fire of any consequence started.

The road at this point passes over a viaduct of eight spans, of 45 ft. each, and about 60 ft. high. It is a deck bridge, the superstructure consisting of lattice girders about 5 ft. deep, and placed 10 ft. apart from centre to centre, on heavy stone piers and abutments. The floor is composed of white oak transverse floor beams, 16 ft. long, 8 in. wide, and 10 in. high, spaced 8 in. apart in the clear. These floor beams are bolted to the girders, and at the ends of the beams guard timbers, 10 × 10 in., are notched on to each beam and bolted at short intervals. The train consisted of an engine and tender, baggage car, smoker, first-class coach, parlor car and dining car. When the accident happened it was on time, and running at the schedule rate of speed, about 45 miles per hour. When within about 650 ft. of the west end of the bridge a piece of the tire on the left-hand rear driving wheel flew out, and after running about 300 ft. further the whole tire was thrown off. As soon as this happened the cast iron spokes of the wheel were knocked to pieces, and in this condition the engine ran on to the bridge. The engine began smashing the sleepers about the fourth span, and the breaking of these seems to have been the immediate cause of the cars falling through. By the time the dining car reached the broken portion of the floor the sleepers had been broken or crowded together so that a long space was left for it to fall through bodily. The engine, tender, baggage and smoking car ran over the bridge off the track to a point about 300 ft. east of it. The baggage car was practically uninjured, but the trucks of the smoker were badly damaged. The trucks of the first-class coach were knocked from under it on the fifth span, and dropped between the iron girders; the body itself went over the side of the bridge, falling bottom upwards, near the west end and on the south side of the structure. The following car, that is to say, the parlor car, was badly wrecked, and fell between the girders of the sixth span, but was supported by them. The dining car dropped between the girders of the fifth span, and forcing one of them to the north and the other to the south, the forward end of the car fell to the ground, while the rear end rested against the top of the pier, between spans four and five. This was the only span in which the girders were displaced, and the displacement here resulted from their being forced sideways in the manner stated.

The floor was apparently a good and strong one, and would doubtless have carried over the train with safety if it had been merely derailed. From the statements of experts and eyewitnesses it seems that the ends of the broken spokes of the driving wheels broke the sleepers. The breakage of the parallel rod doubtless contributed to this result, or, perhaps, was a main factor in producing it.

The superstructure of this bridge was built in 1879 by Clarke, Reeves & Co., of Phœnixville, Pa., and was considered to be abundantly strong for the heaviest loads that were run over it.

The verdict of the jury at the coroner's inquest was that the accident was due to a broken tire, and they exonerated the company from all blame.



COMPENSATING CONNECTION FOR SEMAPHORES.

Made by the RAMAPO IRON WORKS, *Hillburn, N. Y.*

Compensating Connection for Semaphore Signals.

We show herewith a device to provide for the expansion and contraction of the connections to a semaphore signal. The position of the connection, as shown in the illustration, is for the clear signal. The semaphore is rigidly attached to the arbor *D*, which is rotated by the crank *H* 3. Any change in the length of the wire connection from expansion or contraction will cause the connections *H* 4 and *H* 5 to move either upward or downward on their centres *S* and *A*. No considerable change in the position of the semaphore would take place until the connection had moved upward in the direction of the arrow for a distance equal to one-half of the compensating capacity. For instance, if the centre line of the target be in a vertical line through the centre of arbor *D*, and if we move the pin *W* upward until it is in line horizontally with *D*, the centre line of target will have been moved only one-eighth of a quadrant to the right; but any further movement of the pin *W* moves the target much more rapidly. *H* 30 is a casting bolted to the post to support the signal arbor.

This connection was devised especially to overcome the serious trouble, known to all signal engineers, caused by the variation in length of the wire from changes of temperature where the distance from the lever to the signal is considerable and the lever movement not variable. It can be adapted to any style of semaphore or signal and used either with single wire or with back wire. The connection between the lever and compensator can also be made with pipe if desired.

The device is manufactured by the Ramapo Iron Works, and it was designed and patented by Mr. H. B. Potter while in charge of maintenance of way of the Troy & Greenfield R. R. and the Hoosac Tunnel, and it was put in use there, and is still in constant service. It is also successfully in use on the Delaware & Hudson Canal Co.'s road and several other lines through New England, the South and the West.

Fifteen Ton Construction and Wrecking Crane.

In a portable crane, the concentration of all weight as near the wheel base as possible is very desirable, for, obviously, the centre of gravity is lowered and its stability thereby increased. In the design of the crane here illustrated, a concave or saucer-shaped base casting, bolted to the car body secures at its lowest central point a short, heavy forged bolt. Under the nut of this bolt, and entirely within the concavity of the base casting, is a cross-beam, and at either end of this beam are bolted the downward projections of two A frames, upon which the shafts and all machinery are placed. Upon the base casting is a roller path supporting a series of rollers directly in line with the thrust of the jib, and supporting the A frames. It is evident from this design that the weight is concentrated as low as possible and a degree of stability is secured which other forms would not have.

Another feature of the design is the method in which the base casting, centre bolt and frames, receive the strains due to the load. With the depressed position of the crane-bolt and the roller bearings of the frames on the base casting, with a weight on the crane-hook the wrought iron bolt is in tension, and the cast-iron base-plate in compression, their most advantageous and economical conditions.

With the absence of a crane post and the substitution of a simple bolt used in tension, not only a large weight of material is saved, but the use of cast iron for the most important member of the crane is obviated, and this eliminates many chances of accidents arising from the severe work and shocks to which this machine is subjected.

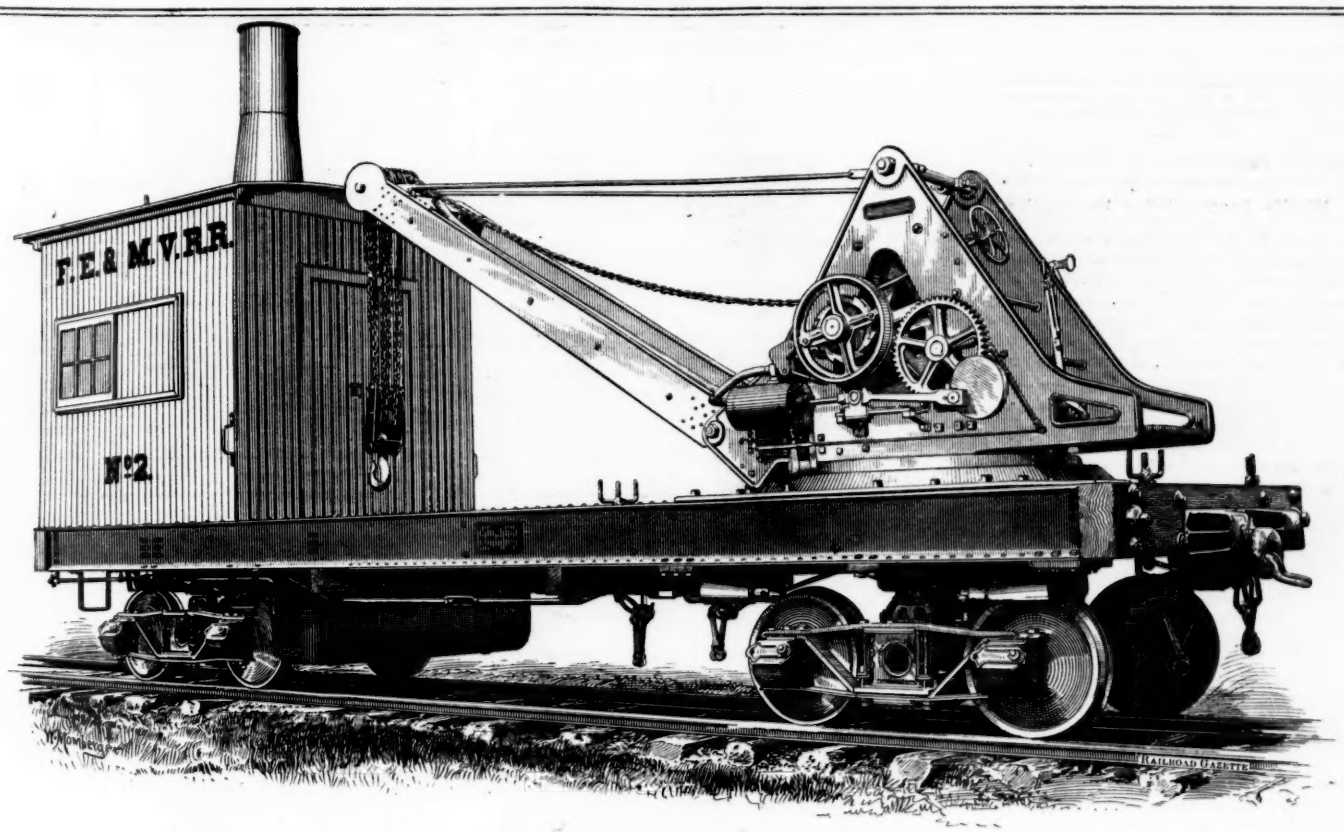
The construction of the car body throughout is of iron. Fifteen-inch I beams with intermediate sills and end-plates, thoroughly riveted together, form a framework for the support of the crane, the boiler and the cab. The deck is covered with plate iron, and the car is equipped with wrought iron brake rigging, wrought iron draft rigging, truss-rods and automatic air brake.

This crane is designed to meet the ordinary requirements for wrecking and construction. Its equipment includes tools for these purposes. The axles, trucks, brake and connections, permit of its attachment to passenger trains for rapid transportation. From its compactness and from the fact that the jib may be slewed to remain within the line of the car body, no additional flat car is necessary during transportation. A proper storage place for coal, as well as a water-tank, makes the machine very complete for all ordinary work.

There are also advantages in the jib and crane slewing a complete circle, for although the crane cannot always lift its full capacity when slewed at right angles to the car, the range of its work is greater. A temporary storage space on the car for material is often convenient, and provision is here made to allow a space of 12 ft. between crane and cab.

These machines are made in capacities from 5 to 15 tons, and the double engines which are bolted to the upright A frames, are made in suitable sizes, as are also the boilers supplying the steam.

Much attention has been paid to securing uniformity of motions and safety to the attendants. Cranes are subjected to severer shocks, at times, than almost any other class of machines. Through the multiplication of strains, a weight through a sudden slipping in its downward course, caused, perhaps, by throwing in gear a rigid clutch, may cause strains many times greater than the capacity of the crane would warrant, or than has been estimated for in its factor



FIFTEEN-TON CONSTRUCTION AND WRECKING CRANE.

Made by the INDUSTRIAL WORKS, *Bay City, Michigan.*

of safety, and the majority of crane accidents are traced to such causes. With these defects known, every motion, whether of lifting or slewing, is performed through friction clutches, which even when applied rapidly, break the shock of a rapid descent, or the shocks due to imparting motion suddenly to a body at rest. Double friction cone clutches operate the slewing mechanism, and while the engine is hoisting the load, the crane may be slewed in either direction with no shock. A cone friction clutch actuates the hoisting chain drum, and a strap brake to which the drum is attached through a ratchet and pawl, absolutely controls the downward motion of the load, so that after hoisting it is impossible for the load to fall without releasing the screw lever, —a provision for the safety of the attendants.

Steam is admitted to the cylinders through the hollow wrought-iron centre pin, which has also a universal swinging joint. Powerful screw-jacks and track clamps support the forward or crane end of the car and add stability during lifting.

The uses to which a crane of this type may be adapted are almost unlimited, not only for construction and wrecking, but in and about freight houses. For lifting, loading, unloading and transferring freight they are invaluable.

This crane was made by the Industrial Works, Bay City, Mich., W. L. Clements, Mechanical Engineer. Three cranes, similar to the one illustrated, were recently delivered to the Chicago & Northwestern for use on its main line and divisions.

Massachusetts Commissioners' Report.

The 20th annual report of the Railroad Commissioners of Massachusetts for the year 1888, which we referred to briefly last week, is a very full and especially valuable document. Besides the usual statistics of railroad mileage, construction, capital, earnings, etc., the board goes into an extensive discussion of steam heating, bridges, accidents to trespassers and provisions for the safety of passengers and the public at stations. In connection with the latter there is printed in the Appendix a translation by Prof. George F. Swain of an elaborate paper by A. Goering, Professor of Railroad Engineering in the Royal Polytechnic School at Berlin, on the law and practice in Germany regarding this subject. The paper is accompanied by a score of diagrams and heliotype views of stations. There is also a special report on the same subject by Prof. E. D. Barbour, embodying the results of inquiries made by him in England during the past year.

Steam Heating.—The report opens with a *résumé* of the laws of Massachusetts on this subject, the first of which was passed in 1882. Additional powers were granted to the commissioners in 1887. The investigations of this board within the past two years are well known. A hearing on the subject was given by the board Dec. 18 last, but only three roads were represented. The report deals quite fully with the objections to continuous heating brought up at the hearing. Incidentally it is mentioned that the Boston & Albany steam-heated train from which the engine was detached near Worcester in the storm of March 12, 1888, was not in so sad a plight as was reported at the time. The temperature in the cars did not fall below 55°. The Boston & Albany now has a rule that the engine of a steam-heated passenger train must never be separated from it when stopped on the road by snow. The report continues: There should be a good and a good-sized thermometer in each car Reasonably satisfactory ventilation can be secured by the exercise of a little care and without large expenditure. A conductor should be persevering and energetic in his efforts to use to the best advantage the appliances furnished. On the question of danger from continuous steam-heating apparatus the board says: "It should be noted that it is not necessary to trust solely to a reducing valve, nor would such a course be expedient. The train pipe should have on it a steam gauge, in plain sight in the front of the cab; and safety can still further be assured by the addition of a safety valve graduated to blow off at a pressure well within the limits of safety. A safety valve under the care of the engineer is more likely to be kept in order than the safety valves in each car used in connection with individual heaters. Furthermore, as a reducing valve may get out of order, it may be well to have an ordinary globe valve in the pipe, in addition. Indeed, if a globe valve, a steam gauge and a safety valve are provided, the reducing valve can, so far as safety is concerned, be dispensed with." The report then goes on to tell the experiments made by the board in the cars of the Old Colony, where it was found that escaping steam, even at 80 lbs. pressure, was harmless to persons in the car, provided they were not in the line of the steam jet nor within 3 ft. of the opening. The results of these experiments are known to all our readers. Figures are given showing the increased use of continuous heating on the principal roads since the previous year. "Locomotive steam heating has now acquired such a foothold that it will probably come gradually into general use without compulsory legislation."

Car Wheels.—Reference is made to the disaster at Bradford, on the Boston & Maine, in January; while the roads of the state are not charged with encouraging the manufacture of cheap wheels, "the safety of the public and true economy demand that still greater care should be exercised, and the general adoption of specifications and tests similar to those of the Pennsylvania Railroad is recommended." The views of the board on the superiority of steel-tired wheels as given in the special report on this accident are repeated, and the special danger to passenger trains on double track roads from derailments of freight cars with poor wheels is emphasized.

Switches.—The Tyler switch, which was in use at Bradford where the derailment occurred, is specially permitted by act of the legislature of Massachusetts. It is recommended that this law be repealed. Facing-point switches, especially at connections with private sidings, are still far too numerous, and the board sets forth the standard of the Boston & Albany and Old Colony roads as deserving of imitation by other roads.

Automatic Couplers for Freight Cars, Continuous Brakes for Freight Trains and Uniform Steam Couplers.—The board refers to its memorial sent to Congress a year ago on these subjects, and believes that Congress can deal with this class of questions, especially that of train brakes, effectively. Reference is made to the additional facility in abolishing grade crossings, which may be effected by the less height necessary for overhead bridges after the adoption of train brakes. A saving of 3 ft. in height means not only less expensive abutments and earthworks, but, in many cases, a substantial diminution of damages to abuttors. "It is probable that on each road this saving of expenditure in the case of one or two of the most important crossings would be equal to the cost of equipping all freight cars owned by the road with automatic brakes." The number of coupling accidents during the year was 154, 25 per cent. more than in 1887. "The multiplication of freight trains, the increase in their weight, the dangerous acceleration in their rate of speed, impose upon the companies a duty to control such trains in a more efficient manner than they have done, or else return to the day of small trains and lighter cars" The board has held a hearing, which the law requires every two years, on the subject of automatic couplers, but no new approvals have been issued.

Bridges.—The report on the bridges of the state, made under a special law of 1887, by Prof. George F. Swain, was referred to in these columns last week. Professor Swain gives tables showing the number and character of all trusses and trestles on each road; the amounts spent by each road for repairs and renewals of bridges during the last seven years, and the percentage of bridges renewed since July 1887. The old style of jack-knife, or folding draw, in which the track rails rest directly upon the upper chords and in which there is a clear open space some 4 ft. wide between the rails the whole length of the draw, is very common in the neighborhood of Boston. The provision of a guard-rail for a bridge of this kind is particularly difficult.

Accidents to Trespassers.—Accidents to persons walking on the track and others strictly classed as trespassers were referred to last week. The statistics show that in England there was 1 accident to trespassers to each 0.73 million train miles yearly, while in Massachusetts there was 1 to each 0.21 million train miles. The report of Prof. Goering shows that in Germany the cases of injury to trespassers are so rare that they are not separately classified in the statistics. The total number of private persons killed and injured in Germany, including those at grade crossings and at stations, the latter forming by far the greater part of the whole, was 1 to each 77 miles of road, while the same classes in Massachusetts aggregate 1 to each 7½ miles of track. The density of population is about the same in both countries. Reference is made to the well-known legal provisions in Germany against walking on the track, as also to the fences and other appliances at stations. In England, as is well known, station platforms are 30 to 36 in. above the track, this circumstance alone proving an effective barrier to passengers crossing tracks. Of the accidents to trespassers in Massachusetts 12 per cent. happened in the city of Boston, 25 per cent. in other cities and 63 per cent. in towns. One-fifth of the whole number of trespassers were stealing rides. The companies are reluctant to invoke the law on trespassers because they retaliate by attempts at train wrecking. The Board recommends a law to keep outsiders off the railroad premises, forbidding them to cross even at a street, except when gates are open or the flagman gives no signal of danger, and a state police is recommended.

It is estimated that there are 5,000 private ways crossing railroad tracks in the state. These are hard to do away with, except at great expense. Easements have been acquired by 20 years' use, which can now be got rid of only by purchase. There are 357 farm crossings on the main line of the Boston & Albany. The authorization of new grade crossings, of which there have been 20 the past year, are discussed at length.

The statistics in the German report are believed to show that the number of accidents at grade crossings in Massachusetts can be materially reduced without separation of grade, by requiring more gates and effectively punishing those who pass under, over or around them. In Germany unprotected crossings must be passed by trains at low speed, and roads running trains at unlimited speed must always provide gates. Highways crossing a railroad diagonally or with steep approaches should be changed to cross at right angles and with level approaches. Gates left unattended at night are snares, and the authority of the commissioners under the law is somewhat doubtful on this point. Many crossings are protected only in the daytime, but the board can authorize nothing less than 24 hours' daily attendance. Extensive reference is made to the discussion and action taken on the subject of grade crossings in the States of Connecticut and New York. A law is recommended limiting the speed of trains to 10 miles an hour at unprotected crossings hereafter authorized, limiting the number of tracks at such crossings, and requiring the company to take land enough to give a good view and provide for future separation of grades. New roads should also be required to locate their route in such manner as to best avoid grade crossings. The authorization of grade crossings for freight tracks only should have a proviso limiting the speed to a very low rate.

Miscellaneous Topics.—The board has investigated the question of legislation to promote the safety of track men, as ordered by a special law, but believes that no legislation is required. No progress has been made since last year in the matter of a union passenger station on the north side of Boston. The Inter-state Commerce act has not very seriously affected the roads of the state. Gross earnings increased 9.6 per cent., a larger percentage than the average for the past ten years, but net earnings decreased. The total number of casualties was 782, 244 being fatal and 538 not fatal. Twelve passengers were killed and 58 injured in train accidents. Of employés, 80 were killed and 311 injured, 12 of the killed and 23 of the injured being attributed to accidents. At highway grade crossings 27 were killed and 32 injured. Of the total number of persons reported to the board as killed or injured 28 were reported as intoxicated. The number of passengers killed and injured from causes beyond their own control is compared to the total number of passengers carried on the principal

roads, and also for the whole state; the latter is given for 10 years. According to the returns the average traveler by railroad in Massachusetts last year ran four times as great risk of losing his life as one traveling by railroad in Great Britain. The risk of being injured and not killed was, however, nearly equal. The number of miles of new road reported to the board for the year ending Sept. 30 was 49. Cable and electric street railroads are discussed.

Woolfe Four-Cylinder Locomotive.

We present in this issue the drawings of, and the results of experiments made with a very interesting quadruple cylinder double expansion locomotive in France. This locomotive is known as the "Woolfe" type. It has four cylinders, two on each side, placed tandem—that is, one in front of the other, and eight coupled wheels. Fig. 1 shows the side elevation of the locomotive. Fig. 2 shows the end elevation and a section through the large cylinder. Fig. 3 is a section through the cylinders on the right hand side.

This locomotive was constructed at the shops of the Northern Railroad of France, at the suggestion of the Alsatian Society, which is a society devoted to mechanical construc-

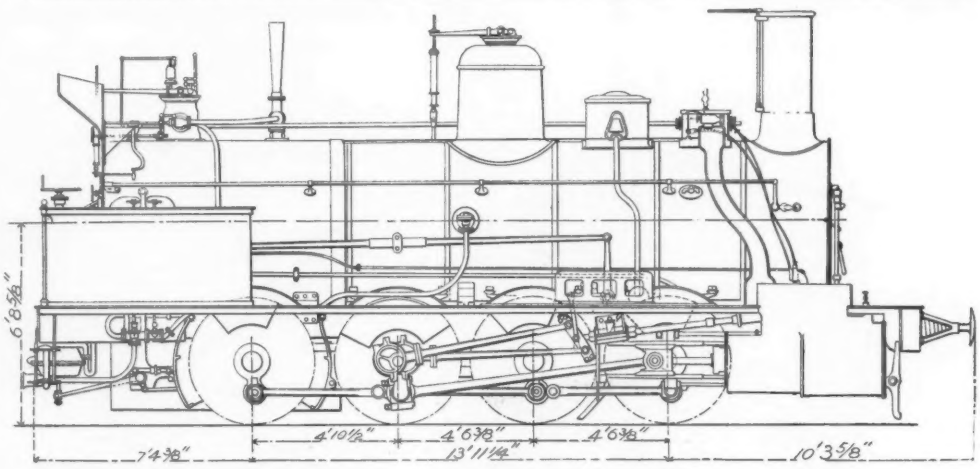


Fig. 1.

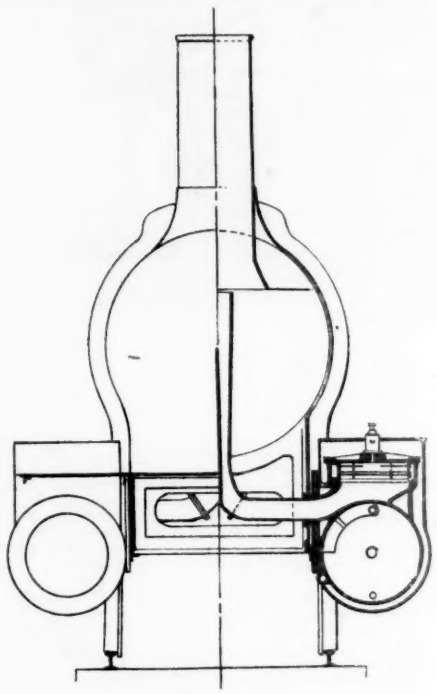


Fig. 2.

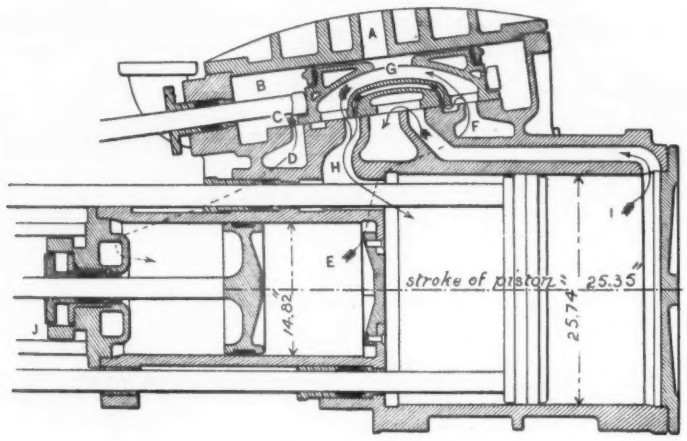


Fig. 3.

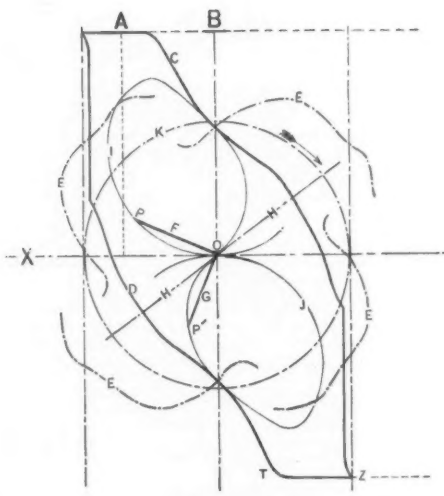


Fig. 4.

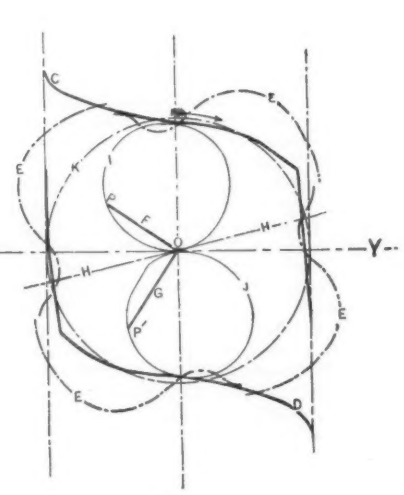


Fig. 5.

tion. This locomotive is precisely the same as those used on the above mentioned railroad with single expansion, with the exception of the cylinders and valve gear, and a few of the details relating to double expansion.

The following are some of the general dimensions of this locomotive:

Diameter of wheels	51.21 in.
" " low pressure cylinder	26.00 "
" " high " "	14.97 "
Stroke of cylinder (same for all)	25.61 "
Driving wheel base	13 ft. 11.3 in.
Heating surfaces:	
Fire-box	98.69 sq. ft.
Tubes	1256.55 " "
Total heating surface	1355.54 " "
Grate surface	22.38 " "
Weight on drivers	113,978 lbs.
Weight available for adhesion	113,978 "
Travel of the valve	6.26 in.
Length of admission ports (same for both cylinders)	17.73 "
Length of exhaust ports (same in both cylinders	17.73 "
Width of admission ports, high-pressure	1.38 "
" " " " low-pressure	1.97 "
" " exhaust ports, low-pressure	3.55 "
" " " " high-pressure	1.38 "
Inclination of valve seat	1 in. in 8 in.
Angle of advance of eccentrics	30 deg.
Throw of eccentrics	2.76 in.

The operation of steam admission and exhaust in this locomotive is as follows: When the train is being started high-pressure steam is admitted to the passage *A* shown in fig. 3, at the top of the steam chest cover, whence it passes down through the main valve, as indicated by the arrow, and into the low-pressure cylinder. Therefore, in starting all cylinders can be used with high-pressure steam if desired.

When operating with double expansion, the steam is admitted into the steam chest at *B*, as shown by the exterior pipes on the side elevation, thence it passes through the port *C* into the passage *D*, and into the high-pressure cylinder. When the steam has been expanded in the high-pressure cylinder it is exhausted, as shown by the arrow at *E*, through the passage *F* and through the large port into the valve *G*, and also through the auxiliary port in the valve, as shown by the arrows, into the passage *H*, and thence into the low-pressure cylinder. After being expanded in the low-pressure cylinder, it is exhausted, as shown by the arrow at *I*, in the usual manner through the exhaust nozzles. The exhaust pipes are independent of each other until near the top, where they discharge into one common nozzle. This is stated to be an improvement over a former construction, which consisted in making one common pipe answer the purposes of both exhausts.

It was necessary to use the double port valve, in connection with the large cylinder, in order to admit the larger volume of low-pressure steam into the low-pressure cylinder, without wire-drawing, it being found almost impossible to sufficiently increase the ports of the low-pressure cylinder, and thus omit the auxiliary port without increasing, beyond a reasonable limit, the ports of the high-pressure cylinder. It will be noticed that the ports as now made are remarkably large. In a design of valve intended to admit and govern steam admissions into both low and high-pressure cylinders. the ports, necessarily, must be large. This valve is made of gun metal bronze and balanced by an annular packing ring, as shown in fig. 3. Any leakage of high-pressure steam past the packing rings is admitted into the low-pressure cylinder. It is stated that this valve, in spite of its complication, has been running a long time with very little wear.

The details of the construction of the pistons are worthy of note, owing to their extreme lightness. The high-pressure piston is forged to the rod and made of steel. The low pressure piston head, also of forged steel, is riveted and keyed to the rods; great attention has been paid to the reduction of the weights of the reciprocating parts to a minimum.

In order to prevent serious disaster to this expensive machinery, in case of the breaking of the connecting rod, the length of the high-pressure piston rod has been arranged so that the cross-head will strike the back cylinder head at *J* before the piston reaches the front end of the cylinder, and for the same reason the spaces between the high-pressure piston and the front cylinder head, when the piston is at the end of the stroke, is less than the distance between the low-pressure piston and the front cylinder head of the low-pressure cylinder when in the same position.

A very ingenious cylinder cock is used with this locomotive, which operates with steam pressure from the cab by opening the valve in the cab. The pressure of steam admitted to the pipe leading to the cylinder cocks opens the cylinder cock and drains the cylinder. The device is very simple and does away with an immense amount of rods and levers so commonly seen. These cylinder cocks are, in this design, bolted to the barrel of the cylinder.

The addition of two cylinders, one on each side of the locomotive, as formerly constructed, has, of course, increased the weight of the front end as well as the total weight of the locomotive. To counterbalance this weight, heavy cast-iron foot plates have been placed under the engineer's feet between the frames at the back end. The weights per axle of this engine before and after being changed to double expansion are as follows:

	Former weights.	Present weights.
1st. Lbs. per axle	26,896	29,674
2d. " "	24,471	31,394
3d. " "	26,675	30,820
4th. " "	20,503	22,090
Total weight	98,545	113,978

Quite extended experiments were made with this locomotive for the purpose of determining, as near as possible, the advantages of double expansion, although it is to be regretted that accurate measurements were not made of the actual amount of water consumed per stroke of the piston, yet, the water consumption obtained, as it is in this case, by measurements of the indicator cards has a comparative value which cannot be disregarded. Conclusions cannot be made with respect to the reduction of cylinder condensation, as a result of double expansion, but the other advantageous features of double expansion, *i. e.*, the increased ratio of expansion, is well and fully demonstrated.

A large number of indicator diagrams were taken from

TABLE D.

Number of indicator card.	Type of locomotive—expansion.	Grade of track, per cent.	Weight of train, tons of 2,000 lbs.	Speed, miles per hour.	Percentage of cut-off high-pressure cylinder.	Average pressure per sq. in. of high-pressure piston.	Average pressure per sq. in. of low-pressure piston.	Foot-pounds of work per stroke of high-pressure piston.	Foot-pounds of work per stroke of low-pressure piston.	Pounds of steam used per stroke of piston determined from indicator cards taken from high pressure cylinder.	Foot-pounds of work per pound of steam used.	Loss of work in per cent. due to single expansion under nearly comparable conditions; the double expansion locomotive being taken as a basis of comparison.
		Per cent.			Per cent.	Pounds.	Pounds.					
1	Single.	1.2	413.4	10.56	.....	.....	.....	56,615	.....	.....	.....	.....
2	"	0.5	729.7	11.81	41.0	72.24	.....	46,994	.....	.480	97,743	16.16
3	"	0.00	496.0	17.40	.....	.....	.....	21,184	.....	.....	.....	.....
4	"	0.00	496.0	21.75	33.0	35.12	.....	22,845	.....	.210	109,261	3.20
5	Double.	0.00	742.5	12.40	35.5	31.85	9.53	11.970	10,802	.202	112,881	.....
6	"	0.55	825.0	13.02	45.0	51.19	15.36	19,096	17 407	.317	115,580	.....
7	"	0.55	825.0	13.02	54.5	63.00	21.76	23,671	24,664	.414	116,534	.....
8	"	0.4	985.6	29.45	55.0	36.83	15.21	13,840	17,247	.259	110,121	.....
9	"	0.5	985.6	10.23	65.0	74.09	30.43	27,840	34,510	.540	115,185	.....
10	"	1.0	605.0	9.30	70.0	79.35	30.86	29,819	34,988	.558	115,843	.....
11	"	1.0	605.0	79.0	84.18	31.71	31,632	35,952	.658	103,000	.....	
12	"	1.0	985.6	Starting trains.	82.0	97.40	36.55	36,605	41,434	.809	96,426	.....
13	Single.	0.9	594.0	8.68	53.0	95.41	.....	61,074	.....	.681	90,963	21.11
14	"	1.0	594.0	8.99	50.0	99.54	.....	64,757	.....	.679	95,110	19.60
15	"	1.0	594.0	8.06	59 0	106.22	.....	69,097	.....	.649	81,288	20.92
16	"	1.0	742.5	Starting trains.	83.0	126.13	.....	82,055	.....	.116	70,757	26.40

these machines on different parts of the line, on heavy grades, ordinary grades and on levels. Representative diagrams are herewith given in numbers 1 to 16. Table D shows the deductions which have been made from these diagrams.

1. The portion of diagrams Nos. 1, 2, 3 and 4, which is cross sectioned at *A*, represents the losses due to wire-drawing. This is the area included between the actual card, the theoretical steam admission line and a true hyperbolic curve, which is considered, in this discussion, as being the true expansion curve.

2. The portion *B*, cross-sectioned in diagrams Nos. 1, 2, 3 and 4, represent the losses resulting from insufficient expansion. It is the area between the actual card, the hyperbolic curve above referred to and the actual line of back pressure.

3. The portion of diagrams Nos. 1, 2, 3 and 4, cross-sectioned at *C*, represents the losses caused by the clearance in the cylinder.

Table A gives the exact amounts of these losses in the diagrams Nos. 1 to 4 inclusive.

TABLE A, SHOWING THE WORK LOST BY REASON OF WIRE-DRAWING, INCOMPLETE EXPANSION AND CLEARANCE SPACES IN THE SINGLE EXPANSION LOCOMOTIVE.

Grade of track. Per cent.	Weight of train, tons of 2,000 lbs.	Relative per centage of losses.				Speed in miles per hour.	Number of indicator card.
		Wire drawing.	Incompl'te expansion.	Clearance spaces.	Total loss.		
1.2	413.4	2.59%	27.1%	2.2%	31.89%	10.56	1.
0.5	729.7	1.97%	23.4%	1.2%	26.58%	11.81	2.
0.0	496.0	7.90%	10.6%	0%	18.50%	17.40	3.
0.0	496.0	6.60%	13 2%	0%	19.80%	21.75	4.

Diagram No. 3 represents the action of the steam when the admission is regulated principally by the throttle, at a speed of 17.4 miles per hour.

Fig. 4 shows an indicator card taken at a speed of 21.75 per hour, while the admission of steam was governed wholly by the valve gear, the throttle being thrown wide open.

The comparison of the loss in fig. 3 and fig. 4 shows that it is possible, under certain conditions, to obtain greater work with less loss when controlling the admission by means of the throttle, than when the admission is wholly governed by the valve gear, in the case of the single expansion engine.

The engineers making these experiments discovered that the runner in charge of the engine, knew by experience when he could perform the work desired with less difficulty by regulating the steam admission by means of the throttle instead of by the reverse lever. This was proved as above shown, by the investigation of the data given by indicator cards.

After the engineers had determined the amount of the above losses of the single expansion engine, they commenced an investigation to see how such losses could be prevented. The decisions after investigation were as follows:

1. To remove the loss due to wire-drawing it was found necessary to work the engine as much as possible with a long cut-off on account of the inferiority of the valve motion in the short cut-offs.

2. To reduce the loss caused by insufficient expansion it was found necessary to do either one of two things.

(*a*) Increase the capacity of the one cylinder,

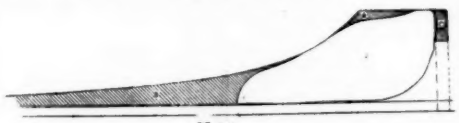
(*b*) or adopt two cylinders and use double expansion.

The difficulties in the way of double expansion were found to be less than the obstacles to be surmounted while increasing the diameter of the one cylinder.

The difficulties to be met with, when increasing the diameter of the cylinder, are:

(*a*) In order to obtain the desired expansion the cut-off must be shortened to a very small fraction of the stroke, which is the point at which the valve motion operates the valve in the most inferior manner. Such conditions much increase the losses due to wire-drawing, and will also increase the amount of compression, and in most cases to such an extent as to render it excessive.

(*b*) Cylinder condensation varies directly with the difference between the temperature of the exhaust and the temperature of the admission, and, therefore, the condensation would be much increased when one large cylinder is used, because in this case the difference in temperatures at the above-mentioned points is greatly increased.



No. 1.

No. 2.

No. 3.

No. 4.

No. 5.

No. 11.

No. 6.

No. 12.

No. 7.

No. 13.

No. 8.

No. 14.

No. 9.

No. 15.

No. 10.

No. 16.

During the discussion of the relative merits of the single and double expansion locomotives, the question of uniformity of the total moments of rotation was raised as being possibly an argument much in favor of the double expansion locomotives. In order to illustrate this the engineers prepared some very interesting diagrams well worthy of consideration by all both for single and double expansion locomotives. These diagrams are shown in fig. 4 and fig. 5. Fig. 4 represents the actual moment of rotation as determined by curate measurements of indicator cards and not from theoretical considerations of such cards. The same may be said of fig. 5.

These are the first diagrams that have been illustrated for a comparison of the double expansion tandem with a single expansion locomotive, and fig. 4 is the most accurate diagram which has yet been published of the variation of the movements of rotation during one complete revolution of a single expansion engine, and it is adapted as well to the ordinary American locomotive as to the European.

The following is an explanation of these diagrams:

The circle shown by the broken dotted line marked *K* is the path of the crank pin during one whole revolution. The full line marked *C* shows the variation of the pressures on the right and left hand pistons during one full revolution. At the beginning of the stroke the pressure is thus seen to be represented by the distance from the center line *X Y* to *A B* for the right hand piston, and by the distance from *X Y* to the horizontal line below at *T Z* for the left hand piston. The amount of the turning moment, at any time, is represented by the product of the effective crank, at that time, into the pressure on the piston at the same time. This product is given for each crank independently by those curves whose forms approach the form of an ellipse, and are marked *I* and *J*. These lines show the moments for any position of the cranks; for instance, let one crank be shown by the full heavy line drawn from *O* the centre of the circle, to *P*; this is the right hand crank and leads the left. The left hand crack is shown by a heavy line drawn from *O* to *P'* and marked *G*. The sum of the length of these lines *OP* and *OP'* represents the total moment of rotation when the cranks are in the positions *OP* and *OP'*, and this sum is given by the curves marked *E* of rotation. The total moment of rotation at this position of cranks is represented by the length of the line *OP* when exteaded to meet the curve *E*. The curves of "moments" and "total moments" are laid out by a system of polar co-ordinates.

If those curves of "total moments of rotation" were circles, concentric with the crank circle, then the rotary effort of the cranks, produced by the pressure in the cylinders, would be uniform. The deviations of these curves from the circle shows the variation in the turning moment. It will be seen from a comparison of fig. 4 with fig. 5, that fig. 5, taken from double expansion engine, shows considerable greater uniformity and less abrupt variation in turning effort of one crank pin than is shown by fig. 4, which is taken from a single expansion engine.

An inspection of the diagrams shows that the variation in the moment of rotation of one crank is about as follows: For the single and double expansion engines (the numbers given being proportional to the actual moments).

Single expansion locomotive.	
Maximum moment	+ 71
Minimum moment	— 25
Difference	96
Double expansion locomotive.	
Maximum moment	+ 48½
Minimum moment	— 3
Difference	51½

This shows that the variation in the moment of rotation of one crank, is far greater in the single than in the double expansion engine.

The following are the maximum and minimum variations in moments of the sum of both cranks:

Single expansion locomotive.	
Maximum moment	+ 66
Minimum moment	+ 42
Difference	24
Double expansion locomotive.	
Maximum moment	+ 67
Minimum moment	+ 46
Difference	21

A comparison of the above turning moments of both cranks shows the double expansion engine to be only slightly more uniform in its total effort of rotation. There is, therefore, between a four cylinder double expansion locomotive, with the cylinders placed tandem, and an ordinary single expansion locomotive almost no difference in the uniformity of the total moment of rotation.

Although, as before shown, the total moment of rotation has about the same uniformity in both types, yet there is marked difference between the variations in torque on the axle. This torque or twisting moment is the difference between the turning moment of one crank on one side and the other crank on the other side. This difference is vastly greater in the case of the single than in the double expansion locomotive as shown by the diagrams and the above comparisons.

An extended study of these diagrams will develop much practical information applicable to American locomotive practice for single expansion engines.

Experiments were first made with this type of locomotive constructed to operate with single expansion. In this form it has two cylinders of the same rated power as the quadruple cylinders subsequently applied to precisely the same engine.

On a line between Bethune and Saint-Pol there is a grade of 1.2 per cent. on a curve of 1,600 feet radius. At this point some experiments were made with 24 cars and tender attached. These cars were loaded with coal. The total weight of the train back of the tender was 413.4 tons. Indicator diagram No. 1 shows the exact character of the distribution of the steam in the single expansion locomotive under the above mentioned conditions.

Indicator card No. 2 was taken on the line between Lens and Arras where the grade is 0.5 per cent. The load consisted of forty-five cars and one tender, the total weight of which was 729.7 tons. This locomotive could have hauled considerably more up this grade, but the regulations of the road limit the number of the car to 45. Table B shows the

comparative coal consumption of the two type locomotives on the same lines of track and under the same general conditions :

TABLE B.

Type of locomotive.	Weight of train. Tons 2,000 pounds.	Weight of coal. Pounds.	Weight of briquettes. Pounds.*	Total equivalent of coal. Pounds.	Coal consumed per mile. Pounds.	Difference in coal consumption per mile. Pounds.	Difference in coal consumption per mile in per cent.
Single expansion.	440	2,420	572	3,278	70.0	9.4	13.5
Double expansion.	440	2,530	202	2,833	60.6		
Single expansion.	495	2,860	972	4,318	92.8	22.8	24.5
Double expansion.	495	2,970	202	3,273	70.0		
Single expansion.	550	2,750	911	4,116	88.2	19.6	22.4
Double expansion.	550	3,190	0	3,190	68.6		
Single expansion.	594	3,190	1,690	5,731	123.2	28.7	23,6
Double expansion.	605	2,860	1,012	4,378	94.5		
Single expansion.	598	2,530	1,672	5,038	108.5	28.0	25.8
Double expansion.	605	3,520	154	3,751	80.5		

*NOTE: The heating value of the briquettes is 1½ times that of the same weight of coal, and in the table the amount of briquettes used has been reduced to the equivalent of coal.

Another series of tests, during which the locomotives were at times allowed to haul the heaviest loads possible within the limits of adhesion, were performed with the following results, shown in table C :

TABLE C.

Type of locomotive.	Miles traveled in regular service.	Miles traveled in switching.	Coal consumed. Pounds.	Briquettes consumed. Pounds.	Total eqivalent in coal consumed. Pounds.	Coal consumed per mile. Pounds.
Double expansion.....	2,099	203	110,000	2,200	113,300	48.3
Double expansion.....	1,968	172	108,800	.....	108,800	49.6
Single expansion.....	2,099	168	114,400	8,800	127,600	55.5
Single expansion.....	2,026	190	112,200	8,800	125,400	55.6

Editorial comment upon this locomotive and its performance will be found in the editorial columns.

Steam Bell Ringer.

The accompanying cut shows a bell ringer devised by Mr. Allen Cooke, General Master Mechanic of the Chicago & Eastern Illinois. Fig. 1 shows the exterior appearance of the bell ringer as mounted on the boiler, and fig. 2 shows the interior construction of the steam cylinder. The piston rod, it will be observed, is jointed, and between the joint and the connecting rod are adjusting nuts by which the length of the connection may be varied. The piston and piston-rod are cast in one piece, and the latter is chambered to receive the end of the valve stem as shown. The valve is actuated directly by the stroke of the piston. The arrangement of this valve motion is so simple as hardly to require explanation.

A hard bushing *F* is forced into the lower part of the steam cylinder. The piston is made tight by packing rings. A loose sleeve fits over the connecting rod, and is attached to the bell crank, the object of which arrangement is to permit the bell to turn independently of the motion of the piston.

The operation is as follows: The steam enters by the steam pipe *M*, passes through the port *N* into the passage *O*, and drives the piston up into the position shown in fig. 2, and raises the bell at the same time. When the piston has reached this point the valve-rod has raised the valve into the position shown, which allows the steam to exhaust back through the passage *O*, through the port *N* and out of the port *P* into the exhaust pipe. The removal of the steam pressure from the piston allows the bell to return to a pendant position. This motion drives the piston-rod, and thereby the valve-rod and valve, down to the bottom of the stroke, which again opens the port *N*, allowing steam to enter and raise the bell, as before. Thus the operation is repeated indefinitely as long as steam is admitted to the steam pipe by the valve inside the cab. The passage *T* is intended to convey to the exhaust pipe any steam which might leak past the piston.

This device is in successful operation on several roads. I is simple in construction and operation, and does not disfigure the locomotive.

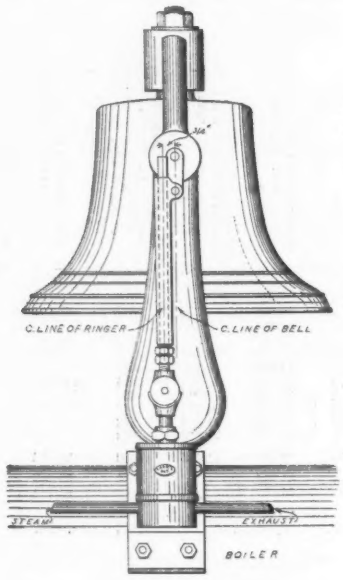


Fig. 1.

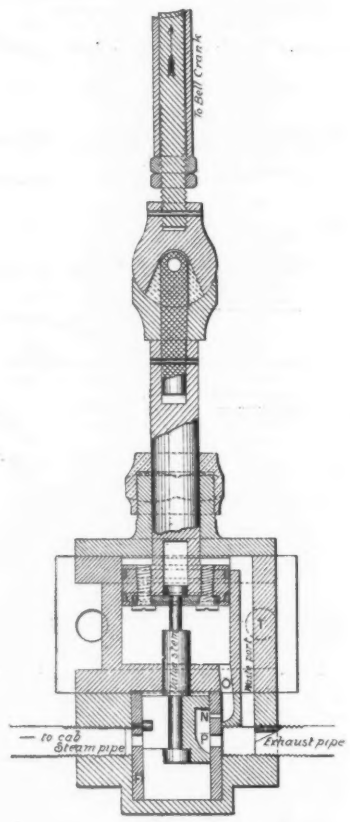


Fig 2.
Cooke's Steam Bell Ringer.

The Inter-state Commissioners' Argument.

LETTER OF THE COMMISSIONERS TO THE CONFERENCE COMMITTEE OF CONGRESS.

WASHINGTON, Feb. 23, 1889.

GENTLEMEN: The Inter-state Commerce Commission feels constrained by a sense of public duty to respectfully present for your consideration a brief statement of reasons why the present session of Congress should not be permitted to close without the enactment of the pending amendments to the act to regulate commerce extending the provisions of the sixth section to joint tariffs, providing for notice of proposed reductions of rates, imposing a penalty upon frauds by shippers, etc.

Section 6 of the act is the one which lies at the foundation of the administrative enforcement of the law. It requires the establishment of schedules of rates, fares, and charges, which are to be filed with the commission, and also to be printed and posted for public inspection; and it forbids the charge of a higher or lower rate for the transportation of passengers or property than the rate specified in such published schedules. This section, however, clearly distinguishes between two kinds of tariffs; one the tariff of individual carriers, the other the joint tariff. The tariff of single roads is first treated in the section. The provisions in respect thereto are clear and apparently adequate, with the exception of failing to provide for public notice of any reduction of rates. Ten days' notice of an advance is required. The pending amendments demanded three days' notice before every reduction. The necessity for this very moderate requirement, in order to give any satisfactory stability to the tariffs, is too obvious to call for explanation.

Inter-state traffic by rail, however, is principally carried upon joint tariffs agreed upon by one or more lines operating continuous routes. Many single roads and systems are inter-state of themselves; but in the case, for example, of the so-called trunk-lines, traffic between the Atlantic coast and the Western states is carried upon what are properly termed joint tariffs; and the same is true of most of the long-distance commerce which the act was especially intended to regulate.

The joint tariff, as the law now stands, is treated very briefly; the only direct provision for its regulation is found in the latter clauses of section 6, and they simply require that joint tariffs shall be filed with the Commission, which may direct them to be made public in its discretion. A tariff which is only required to be lodged in the office of the commission affords little information to the public or to competing carriers; and in practice this requirement has tended to afford opportunity for the manipulation of rates and frequent changes in rates rather than to check those evils. Nor would the requirement of publicity subserve any useful end so long as joint tariffs are subject to be increased or decreased without notice. There is little practical value in publicity when absolute uncertainty is an added factor; it would be trivial to advertise a rate that may be varied from at pleasure. Such a construction of the law is claimed by many carriers; the argument in its favor is so strong that the regulation of joint rates cannot be efficiently enforced until the amendments proposed are enacted.

One of two recent examples may assist in making this matter clear. The west-bound transportation of sugar from the Atlantic coast refineries, under the tariffs and classifications of the carriers, requires the payment of freight upon the weight of the barrels as well as upon their contents. One line from one city, two lines from another city, and all the lines from a third city were suddenly found to be carrying sugar at the net or invoice weight, without charging for weight of packages. The result was confusion and loss of confidence among the carriers, coupled with uncertainty and discrimination among shippers by different lines and from different points. Although the margin was a narrow one it was enough to control the traffic, and the jobbing houses of the interior became justly excited and alarmed. The case was one that would be easily regulated by the provision against charging a greater or less sum than the tariff rate, and the proofs might properly have been placed at once in the hands of the proper United States attorneys but for the fact that the business in question was handled on through routes and by joint rates, and joint tariffs are not now clearly within the protection of the law. Again, grain rates have been recently the subject of manipulations in many quarters. Arrangements are made by which a through rate from an initial point to an intermediate junction point is combined with a through rate from a point west of such junction point to the ultimate terminal. The result is a reduction of the total rate, to the advantage of some locality and to the detriment of others. This is all joint-tariff business, and is so managed that it may be claimed not to be illegal. And again, a sudden reduction of long-distance rates, made to meet secret or crafty combinations like those last described, is ordered without public notice in advance and without advice to many shippers most interested. The forms of the law are complied with, while the entire available traffic is absorbed by a few buyers of grain who are on the spot at the lucky moment.

These illustrations suggest to the close observer many other methods in which the law now fails to effect its beneficial purpose of requiring just, equal, and steady transportation charges, beneficial alike to the carrier and the shipper everywhere. In failing distinctly and positively to regulate the construction, notification, and operation of joint tariffs the statute is deprived of a great part of its usefulness.

The amendments particularly designed to reach this difficulty are in the following words:

"Reductions in such published rates, fares, or charges shall only be made after three days' previous public notice, to be given in the same manner that notice of an advance in rates must be given. * * * No advance shall be made in joint rates, fares, and charges, shown upon joint tariffs, except after ten days' notice to the commission, which shall plainly state the changes proposed to be made in the schedule then in force and the time when the increased rates, fares, or charges will go into effect.

"No reduction shall be made in joint rates, fares and charges, except after three days' notice, to be given to the Commission as is above provided in the case of an advance in joint rates. The Commission may make public such proposed advances or such reductions in such manner as may in its judgment be deemed practicable, and may prescribe from time to time the measure of publicity which common carriers shall give to advances or reductions in joint tariffs.

"It shall be unlawful for any common carrier, party to any joint tariff, to charge, demand, collect or receive from any person or persons a greater or less compensation for the transportation of persons or property, or for any service in connection therewith, between any points as to which a joint rate, fare or charge is named thereon, than is specified in the schedule filed with the commission in force at the time.

"The commission may determine and prescribe the form in which the schedules required by this section to be kept open to public inspection, shall be prepared and arranged, and may change the form from time to time as shall be found expedient."

The necessity of the immediate passage of these amendments can not be too strongly stated. Another amendment is designed to provide for the punishment of shippers who fraudulently procure preference in transportation. The commission has been frequently urged the importance of this provision, and its suggestions have been re-enforced by petitions from leading commercial organizations and business men in all parts of the country. Two cases of underbilling have been investigated during the present month. In one of them a shipper at a small country station procured the station agent to bill 44,100 pounds of grain as 30,000 pounds, a fraud which, if not detected, would have saved him $27.67 in freight. In the other a car-load shipper obtained a series of short weights from a weigh-master in charge of the company's scales; the loss to the line upon two car-loads only would have been $45.99. One shipper writes: "If you can figure any way to get around the 'American Street Yard Scales,' I would be glad to work something your way; or have you any country points on the Philadelphia & Reading road that can be worked?" Another: "We think it would be a wise precaution on your part to pay the freight yourselves on these cars we are shipping underbilled so that the trade will not get on to it and make a stink as they did on a former occasion; if we can keep the thing mum, and the railroads do not find it out, we can do you some good and ourselves also." The representative of a leading commercial organization writes as follows: "There is no doubt in my mind that if Congress adjourns without passing Senate bill No. 2,851, underbilling and all frauds will be more rife than ever before. I do hope that you will be able to secure the adoption of this law. If it fails to pass every decent and self-respecting man might as well go out of the business."

Other important modifications are contained in the amendments which have been already concurred in by both Houses of Congress. They are believed to be self-explanatory, and therefore no further comment upon them need be made than to say that they affect constitutional and practical questions relating to the work of the commission in the enforcement of the law. The efficiency of the administration of the act to regulate commerce is most deeply involved in the pending measure.

Continuous Steam Heating for Passenger Cars—Return Systems.

At the meeting of the New York Railroad Club in New York City on the evening of Feb. 21, Mr. R. G. Chase, representative of the Williames system (illustrated and described in the *Railroad Gazette*, Dec. 2, 1887 and Feb. 24, 1888), read a paper on the general subject of steam heating of railroad trains, with special reference to the merits of the return system, by which the water of condensation is all carried back to the engine. We give herewith a condensed account of Mr. Chase's address:

Steam heating generally has been adopted with the apparently simple purpose of making cars warm enough; all considerations of economy, simplicity, ventilation, etc., being held in the background. Our chief guide must be the general principles learned from experience in the heating of buildings. Cars are simply rooms with the conditions to be overcome aggravated. The great exposure to the outer atmosphere on all sides, the frequent opening of doors, and the difficulty of arranging piping in a suitable manner, are the special obstacles. At the New England Club last April Mr. Coleman named as the desiderata large pipes, avoidance of bends, couplings as large as the pipes, and the adoption of a system which will bring back the

waste water for use a second time before it has lost all its heat. The objects aimed at by the Williames system could not have been better stated, and our principles are: 1. Low pressure; this necessitates large heating surface. 2. Large supply pipes and connections, to be run as near a direct line as possible, avoiding elbows and "pockets"; ample volume of steam and absence of friction and condensation are thus secured. 3. The larger share of heating surface should be placed at the coldest points, and less near the warmer parts in the centre of the car. 4. Pipes must have ample pitch for drainage, that there may be no loss of heating surface by clogging of pipes with water and no necessity for increased pressure to drive the water out. 5. Water of condensation should be returned for use in the boiler, thus utilizing heat otherwise lost, amounting from 5 to 15 per cent. This distilled water will remove scale from boilers.

Heat sufficient for ample ventilation can and must be provided for. No system failing in this is worthy of success. Providing for ventilation demands largely increased heating surfaces, and therefore produces additional condensation, which, with anything but a return system, increases the difficulties. Proper pitch of pipes being impossible in a car, single line systems use additional pressure; this causes the extreme and variable temperatures so loudly complained of on all sides. One of the systems carrying the the highest pressure had a number of cars frozen in the recent cold spell. High pressure involves high temperature, which devulcanizes the rubber in the hose. Many of the traps and valves in use are unreliable, and the trainmen often have to open the train pipes and run with them open. The Chicago, Milwaukee & St. Paul still has serious trouble in severe weather, and stoves have had to be lighted daily.

The Williames system, with its vacuum pump on engine or tender, thus drawing all the water back by a pipe connected with the heating pipes at the centre of each car, produces a rapid circulation, even with steam below the pressure of the atmosphere. The pump is run continually, and therefore draws out the water even when steam is shut off. The Williames system is not a method of piping, nor of traps and valves. It is simply an addition to the best results elsewhere attained. It can be used with any system, including the Baker heater. Exhaust steam from the brake pump is sufficient in all ordinary weather. The propriety of using exhaust steam is evident from the fact that larger locomotives and higher pressures are constantly being introduced. To say that the power taken from the locomotive is not worth mentioning is, under these circumstances, absurd. The return pipe will not freeze like a trap. Eight years experience in buildings has enabled it to displace the best traps in the market. The experience of the Pennsylvania with a train of 12 cars, proved that there was no difficulty whatever with water in the return pipe. In a recent trial from Altoona to Gallitzin, with 9 cars, the train was warmed with a pressure of 3 lbs. at the tender, and while the forward car was not uncomfortable there was a current of warm air from the radiator in the ninth car. All the cars were fitted up with box coil radiators at the ends. The steam and return pipes are each 2 in. in diameter, with only 1½ in. variation from a straight line in the whole train and no "pocket" at the couplings.

The Timlin-Heidinger Heating System on the Rome, Watertown & Ogdensburg.

This system has been used on a train of three cars on this road between Utica and Ogdensburg during the past winter. The results have been satisfactory to the road as well as to the owners of the device. This system was fully illustrated and described in the issue of the *Railroad Gazette* of Dec. 7 last, but some material changes have since been made. A cylindrical reservoir, about 44 in. high and 16 in. in diameter, is placed in the corner of each car and connected with the engine by a 1 in. train pipe running the entire length of the train within the cars. This steam pipe taps the locomotive both below the water line and in the steam space, the object in tapping the boiler below the water line being to collect in the reservoir hot water when the car is to be side-tracked; this hot water assists in maintaining the car at a comfortable temperature for some time after the engine is disconnected. From the storage tank the steam is distributed to the radiating pipes of the car. The entrance of the steam from the storage pipe to the train pipe is regulated by a single valve. The piping is trapped by an expansion trap known as the "Hawes;" it is filled with alcohol. The coupling used thus far with this system has been the Westingbouse air-brake coupling, with a special gasket, costing 2 cents each. In this system the auxiliary heater is a part of the system itself. It is, strictly speaking, an auxiliary direct steam heater. The water, which is stored as above described when the car is side-tracked, is heated by a fire placed in the fire chamber, underneath the storage reservoir, steam being thus generated at any desired pressure. The condensation is returned to the storage reservoir by an automatic gravity trap. When this trap is in operation the regular expansion trap is cut off. The supply of water placed in the storage tank at first when the car is side-tracked is sufficient to operate the system for auxiliary heating for an indefinite length of time. The success of the operation of this device during two very cold periods, when the thermometer ranged from 15 to 30 deg. below zero at Ogdensburg, was wholly satisfactory. The facts, as reported, are about as follows: No difficulty was experienced with the air brake hose or coupler, and the temperature in the coaches was maintained at 70 deg., with only slight variation, with a pressure on the radiating pipe not exceeding 1 lb. The pressure on the train pipe averaged about 5 lbs. No difficuty was experienced by loss of steam power of the locomotive, and the small amount of steam necessary to heat the cars was not preceptible by the engineer. An actual test of the value of a storage tank in maintaining the temperature of a car when detached from the engine was made with the thermometer 10 deg. below zero. The storage tank was filled with water and steam at 20 lbs. pressure, and after 2 hours and 45 minutes the car was at a temperature of 65 deg. Experiments were made in the presence of the officials of the road at Utica, a few days since, to determine the danger resulting from the escape of steam into a car. In order to prove that dry stream would not burn or scald a person in case of accident, a stop cock in one of the storage chambers was opened after the pressure had been raised to 20 lbs. Those present could place their hands and face in the steam jet without the slightest trace of burning or scalding. This is attributable to the fact that the steam is perfectly dry. It is stated that this system has not frozen up this winter, even when the temperature at Ogdensburg was 39 deg. below zero. The company is devoting its efforts this winter toward the perfection of its devices.

Conference of Railroad Commissioners.

The National Conference of State Railroad Commissioners held in pursuance of the recent invitation of the Inter-state Commerce Commissioners, was held in the rooms of the Inter-state Commerce Commission at Washington on March 5, 6 and 7. There were present all of the members of the Inter-state Commerce Commission, the Secretary, Auditor and Statistician, and the following from the various states:

ALABAMA.—Henry R. Shorter, President of Board.
CALIFORNIA. ——.
CONNECTICUT.—George M. Woodruff, William O. Seymour.
FLORIDA.—William Himes.
GEORGIA.—A. C. Briscoe, Secretary.
IOWA.—Spencer Smith, Frank T. Campbell.
KENTUCKY.—I. A. Spaulding, Chairman; W. B. Fleming, J. F. Hager.
MAINE.—David N. Mortland, Roscoe L. Bowers.
MASSACHUSETTS.—George C. Crocker, Chairman; Edward W. Kinsley, Everett A Stevens.
MICHIGAN.—John T. Rich.
MINNESOTA.—Tams Bixley, Secretary, representing the Commission.
MISSOURI.—William G. Downing, Commissioner.
NEBRASKA.—G. L. Laws, T. H. Benton, William Leese, I. E. Hill, John Steen, Commissioners; J N. Agre, O. P. Mason, Secretaries; H. M. Waring, Chief Clerk.
NEW HAMPSHIRE.—John M. Mitchell, Commissioner; B. P. Prescott, Clerk.
NEW YORK.—Michael Rickard, Commissioner; M. C. McEntee, Stenographer.
OHIO.—William S. Cappeller, Commisioner.
PENNSYLVANIA.—Isaac B. Brown, representing the Department of Internal Affairs.
SOUTH CAROLINA.—Milledge L. Bonham, Chairman; D. Arcy P. Duncan, Eugene P. Jewey.
VERMONT.—Samuel E. Pingree, Chairman; Truman C. Fletcher, Ebenezer J. Ormsby.
VIRGINIA.—James C. Hill, Commissioner.
WISCONSIN.—Atley Patterson, Commissioner.

There were also present Ex-Commissioner Coffin, of Iowa, and, by invitation, the following representatives of the Association of American Railway Accounting Officers;

President Marshall M. Kirkman (C. & N. W.); First Vice-President M. Riebenack (Pennsylvania); Secretary C. G. Phillips, (C. & N. W.); and the following members of the Executive Committee: J. P. Whitehead (A., T. & S. F.). Cushman Quarrier (L. & N.), S. M. Williams (Central of N. J.), D. A. Waterman (Michigan Central), Chauncey Kelsey (Chicago & Alton); Stephen Little (Pullman's Palace Car Company); Chairman, W. T. Thelin (B. &. O.); H. D. Buckley (B. & O.); O. W. Mink (Western Pennsylvania); C. I. Sturgis (C. B. & Q.); C. M. Higginson (C. B. & Q).

A committee appointed for the purpose, reported an order of business as follows: Uniform statistics; uniform classification of freight; railroad legislation; railroad construction, question of controlling it by legislation; heating, lighting, automatic brakes and couplers; taxation.

Mr. H. C. ADAMS, Statistician of the Commission, read a carefully prepared paper on "Uniformity in Statistics." He pointed out that we must have a common method in order to secure results commensurate with the energy expended. Uniformity in the classification of statistics is the only feasible plan by which there can be accuracy in conclusions, and by which the conclusions drawn from statistics may be made useful. As an example of the difficulty of securing correct statistics, Mr. Adams mentioned the simple matter of mileage. He pointed out the fact, well-known to those who have had experience in this matter, that mileage reports from two different officers of the same corporation frequently differ. Further, uniformity is necessary in order to provide a practicable test of the accuracy of statistics by comparison of the work done by one state with that done by another. Mr. Adams also pointed out the difficulty of getting accurate or at least consistent reports of the stocks and funded debt per mile of roads, arising from the various theories by which this indebtedness is apportioned by different officers. This is probably even more difficult in the case of the unfunded debt. The writer accounted in this way for the difference which appeared in his estimate of the proportion of the unfunded debt of the railroad companies and the estimate made in a criticism of his statistics in the *Railroad Gazette*.

It is of great importance, for many reasons, that the entire amount of property invested in the business of internal transportation should be known, but stocks and bonds do not give a measure of this. An immense amount of property is invested in private bridge companies, terminal companies, car trusts and other organizations, all of which is actually employed in inland transportation, and charges upon which must be paid out of traffic earnings. It would be of great advantage to the public and to the Commissioners if these items could be known and properly classified. The existing state laws permit a uniformity of classification among the different state commissioners. That is, most of the laws make the scope of the inquiries of the state commissioners so wide that it would bequite practicable for the commissioners to bring them into harmony, one with another. But, in practice, there is considerable diversity. A diagram was shown indicating what the practice is in each state, as compared with that of the inter-state Commission, in information sought, and in its grouping and classification. It was suggested that the investigation of the various commissions should be brought into harmony in the following particulars:

The fiscal year should be the same.

A uniform classification of operating expenses should be adopted. What is known as the Saratoga classification appears to be generally adopted by state commissioners and to be accepted without much objection by the railroad companies.

Agreement should be reached as to whether or not taxes are to be classed as fixed charges.

There should be some rule established for estimating the deterioration of property.

The question of charging permanent improvements to operating expenses or to property account is also one which should be brought up.

Mr. Adams' report was received and ordered printed, and a vote of thanks was passed. On motion the chairman appointed a committee of five state commissioners to act with Mr. Adams, of the Inter-state Commerce Commission, and Mr. Kirkman, Chairman of the Association of Railway Accounting Officers to consider and make a report on this matter of uniformity in statistics. The state commissioners appointed on the committee were Messrs. Spalding, of Kentucky; Hill, of Virginia; Cappellar, of Ohio; Seymour, of Connecticut, and Peterson, of Wisconsin.

General discussion of the subject followed.

Commissioner WALKER wished it well understood that the form put forth by the Inter-state Commerce Commission is not considered by it to be perfect. It has defects and it is subject to changes and corrections.

A motion was passed to the effect that it is the sense of the convention that a system of accounts uniform as to time and method should be adopted.

The question of uniform classification was then taken up. A resolution passed by the Louisville Board of Trade was read, strongly urging uniformity in the classification of freight.

Commissioner Walker said that there is a very widespread and decided feeling throughout the country in favor of uniformity. The great associations—the Trunk line, the Central Traffic, the Western and the Southern Railway and Steamship Association—have classifications that are generally adopted throughout wide territories. But much difficulty arises from the classifications fixed by certain individual states. These variations might well be got rid of. But to assimulate the three great classifications will be a work attended with great difficulties and some danger to the interests of the public and of the railroads, and it should be approached with great caution.

It was suggested by a Commissioner from South Carolina that a general classification might be adopted for the country, and "exception sheets" be provided in the various states—an arrangement which has been found to work well in South Carolina.

Chairman COOLEY had found the feeling among railroad officers in the Northwest quite hopeful of the possibility of bringing about a uniform classification within a comparatively short time. They are generally in favor of it, but recognize, of course, the great difficulties.

Mr. SMITH, of Iowa, submitted a resolution to the effect that it is the sense of this convention that a uniform classification of freight should be adopted as soon as it can be done without injury to business interests. Considerable discussion ensued, which developed a pretty general feeling that the subject is too large and too complicated to be hastily approached.

Chairman COOLEY expressed himself as much pleased at the remarks of the various speakers, for they indicated the difficulties of the situation, and would have a good effect in educating public opinion in the various states. The average business man supposes that it is simply necessary to fix and adopt a uniform classification, without recognizing the complexity of the interests involved. Therefore the expressions of the commissioners present must certainly yield good results. The resolution was made a special order of business for the morning session of Wednesday.

At the session of Wednesday morning, the consideration of the resolution concerning uniformity in classification of freight was taken up.

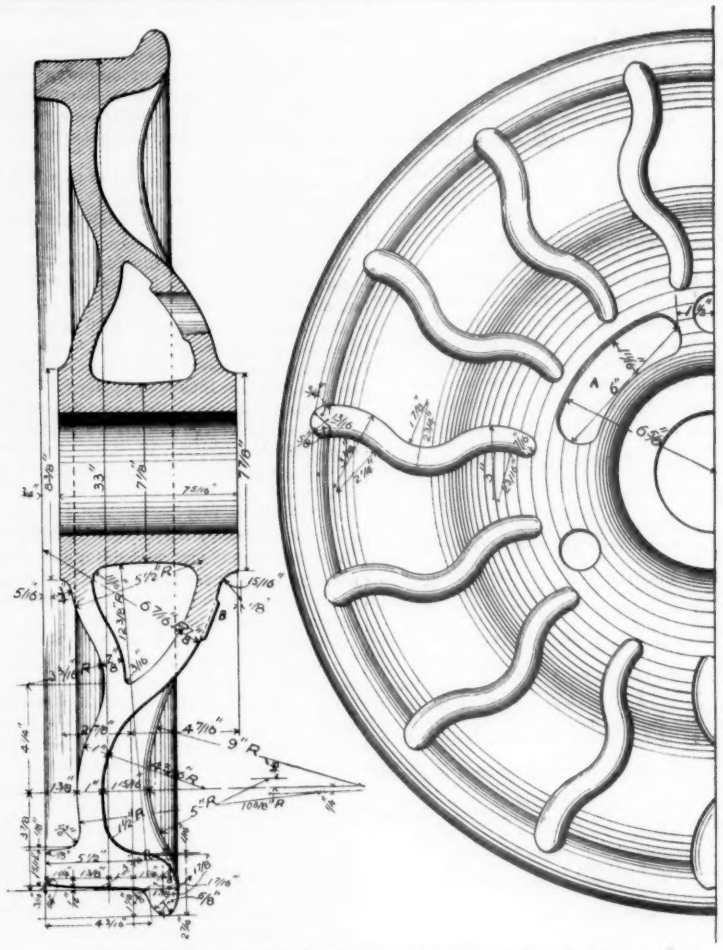
Mr. CROCKER (Mass.) offered as a substitute for the resolution before the convention, the following:

We believe that still further advance toward uniformity in classification of freight will promote the convenience and welfare of shippers and railroad companies, and we commend conservative and persistent effort toward that end.

In support of this resolution, Mr. Crocker said that the one for which this was suggested as a substitute would imply that the convention thinks that uniformity is possible, but in his opinion, it is not at all clear that such is the case.

Chairman COOLEY suggested that uniformity of freight classification can never be absolute. That when the closest approach to uniformity is reached, there must still be special commodity rates in various localities. The opinion of the Inter-state Commerce Commission upon this matter having been asked by a member of the convention, Chairman Cooley pointed out the impropriety of the Commission taking part in any such general discussion, or expressing any general opinion now on the subject. The whole matter is one that is entrusted to the Commission for administration. Cases are now pending before the Commission, in which this matter of classification is vital, and there will be manifest impropriety in any general expression of the opinion of the Commission in advance of the publication of its decisions. The substitute resolution, offered by Mr. Crocker, was adopted.

The convention passed to the consideration of the topic of railroad legislation, and the means of securing harmony



STANDARD THIRTY-THREE-INCH WHEEL—UNION PACIFIC.

therein. Mr. CROCKER stated that it is quite certain that the railroad laws of Massachusetts could be much simplified and improved. As they stand now, they are the result of the growth of years, and contain inconsistencies, and are difficult to construe. This is probably the case in many other States. He suggested the appointment of a committee of three to take the matter into consideration, and report to the convention upon it.

Mr. WOODRUFF, of Connecticut, agreed with Mr. Crocker and suggested that there should be some definition of the field to be covered, as the subject is one of immense range.

Mr. MASON, of Nebraska, said that the law in his state is practically the Inter-state Commerce Act with the 17th section left out. This is found quite sufficient in its operation, and is satisfactory to the Commissioners and railroad companies.

A resolution was passed appointing a committee of three to take into consideration the question of railroad legislation, and make a progress report during the session of the present convention.

Mr. SPAULDING, of Kentucky, reported progress from the committee on uniform statistics, and asked leave for the committee to sit again. The most important recommendation reported was to make the fiscal year for reports to the state commissioners end June 30. This subject was considerably discussed. Mr. BROWN of Pennsylvania particularly objected to the date. He presented statistics showing that out of 627 railroad companies, 295 close their fiscal year on December 31; 147 on September 30, and 99 on June 30; the others at various periods. He thought that in the consideration of this fact, it would be better to have the uniform fiscal year end Dec. 31.

Commissioner COOLEY and others stated the reasons which had prevailed with the Inter-state Commerce Commission, and with the Saratoga conference of State Commissioners, in deciding on June 30. This date permits reports to be received, compiled and collated, and deductions drawn from them in time for presentation to the various state legislatures at the beginning of the winter sessions; whereas, reports received Dec. 31, or later, could be of little value in that legislative year.

Mr. KIRKMAN (Comptroller Chicago & Northwestern) though tthat the railroad companies, generally, would be glad to accept June 30 as the best compromise, and would be ready to agree upon a uniform fiscal year.

The further progress, reported by this committee, consisted in a few changes suggested in the headings in the Inter-state Commerce Commission's form of annual report. The report, so far as presented, was adopted by the convention, and a final report was to be made Thursday morning.

A resolution was passed to provide for annual meetings of the state railroad commisioners in convention, and for the appointment of a committee of three, to include the chairman of the Inter-state Commerce Commission, to fix the date and place of the next meeting.

Commissioner RICH, of Michigan, brought up the question of protection of grade crossings by interlocking switches and signals, and stated the present condition of the matter in Michigan, and asked for the experience of other commissioners. There was no discussion of any value upon the subject.

The subjects of heating and lighting trains, of automatic couplers and other safety devices, came next in order of business.

Mr. CROCKER offered a resolution, which was adopted, asking the Inter-state Commerce Commission to consider what could be done to lessen the loss of life and injuries to employés in coupling and braking, and how the increase of the use of steam heat for trains could be best promoted, and to make recommendations, drawn from their conclusions, to the railroad companies, and suggest legislation.

Mr. COFFIN, formerly railroad commissioner of Iowa, was given permission to address the conference in behalf of the Brotherhood of Brakeman, and made a stirring speech, setting forth the loss of life and limb among that class of employés by coupling accidents, and defective brake apparatus, and urging the importance of legislation upon these subjects. He said that legislation could be in no way injurious to the railroad companies, inasmuch as the automatic coupler, and automatic brake are now so perfect as to be not only practical, but actually economical in the long run. He presented figures showing that 2,400 brakemen had been killed and maimed in Iowa in 10 years by this class of accidents, which he would prevent by the legislation suggested. Last year the number was 349. Estimating from the ratio of the mileage of railroad in Iowa to the total mileage of the United States, Mr. Coffin concluded that over 6,000 brakemen are killed and injured in the United States every year by these accidents. That is considerably more than the whole number of individuals who have been killed and injured in all the great accidents of the United States for 50 years. Legislation on the subject of heating and lighting, he did not deem necessary. These are matters in which railroad companies will move without legislation, and he pointed out that out of 25 million passengers carried in Iowa last year not one was killed, and there was no injury from the burning of cars.

An invitation was extended to the delegates to accompany the members of the Inter-state Commerce Commission to call on the President at 9:30 Thursday morning, and the convention adjourned to meet at 10 o'clock a. m.

Standard 33-in., Cast-Iron Wheel, Union Pacific.

The accompanying cut shows the detailed dimensions of a standard 33-in. single plate, cast-iron, chilled car wheel in use on the Union Pacific. This is a 600-lb. wheel, having 1-in. plate, stiffened with brackets $1\frac{3}{16}$ in. thick. It is used in both passenger and freight service. The following are the standard regulations for marking passenger and freight car wheels on that road. Wheels to be used indiscriminately are to be marked by both methods at the same time:

Passenger Wheels.—Wheels cast of this pattern for service under passenger equipment, or for passenger or freight tenders, are designated by a raised letter *P* cast on the back or inside; this letter to be not less than 3 in. long, and raised not less than $\frac{1}{4}$ in.

All wheels for passenger service or for tender trucks must have a raised plate 1 11-16 in. wide by 6 in. long, as shown at *A*, and raised as shown on the section at *B*, cast on the same side of the wheel as letter *P*. This plate is used to stamp on U. P. number and date of application of wheel.

All of the above wheels must have the mileage guarantee cast in raised letters and figures, on the back or inside plate. The letters and figures must be not less than $1\frac{1}{4}$ in. long and raised not less than $\frac{1}{8}$ in. The maker can put on the words "Guaranteed for [the number of miles required]," or simply the number of miles.

All wheels must also have a number and date, in raised letters and figures, cast on the back or inside plate. A series of numbers is furnished for the manufacturer from the office of the company, and numbers put on must be consecutive, and the numbers made vacant by wheels lost in casting must not again be duplicated. Letters and figures must be not less than $1\frac{1}{4}$ in. long and raised not less than $\frac{1}{8}$ in.

Freight Car Wheels.—Wheels cast of this pattern for freight car service are designated by a raised letter *F*, cast on the back or inside plate of the wheel, this letter to be not less than 3 in. long and raised not less than $\frac{1}{4}$ in.

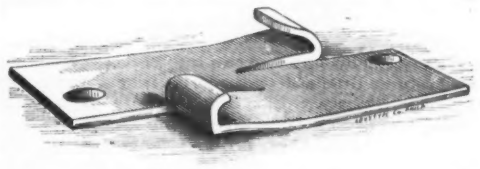
On wheels for freight car service the words, "Guaranteed for 3 years' service" or "3 years' service," must be cast on the back or inside plate in raised letters and figures. These letters and figures must not be less than $1\frac{1}{4}$ in. long and raised not less than $\frac{1}{8}$ in.

All wheels must also have a number and date in raised letters and figures cast on the back or inside plate, and the same provision is made for numbering the wheels in series as in the case of passenger wheels.

The Elastic Tie Plate.

In a paper read before the Institution of Civil Engineers recently, Mr. C. P. Sandberg described a steel tie plate in considerable use experimentally in Sweden. This plate is shown in the illustration herewith, and requires but little description. The clips clasp the rail flange when the plate is at right angles with the rail. By slipping the plate off the tie and turning it 45 deg., it can be removed without disturbing the rail. The provision for securing an elastic action is apparent. Those portions of the plate on which the rail rests are bent up slightly, and thus form a spring. The plate can be fastened to the ties by any of the usual methods.

This tie plate was put in use early in 1883 on the Ystad-Eslof Railroad, in Sweden, when about 100 wooden ties were taken out and replaced by longitudinal rock sleepers, with the elastic plate. The experiment is reported to have been



entirely successful. The tie plate has answered every purpose for which it was intended, and has lost none of its elasticity. The noise is diminished and the motion of the trains made smoother. On another Swedish road these tie plates have been in use on wooden ties in a few thousand feet of track for five years. The General Superintendent states that the plates have lost none of their elasticity and none have been broken. We have no statement of the nature of the traffic on these two roads, the weight of locomotives and cars, or the dimensions of the plates.

The principle of this device would seem to be particularly applicable to iron ties, or to track on bridges and elevated railroads. It is suggested by the inventor that ties could be entirely dispensed with in tunnels and rock cuts by smoothing the face of the rock and putting the plate directly upon it.

The bearing of the use of a tie plate upon the general question of increasing the life of wooden ties, need not be discussed here, but it is a matter of great importance and growing interest.

Mr. C. W. Stuart, 31 Broad street, New York, is the owner of the patent for this plate in the United States, and will give any further information desired concerning it.

The Influence of Chemical Composition on the Strength of Steel Tires.

At the meeting of the Institute of Civil Engineers, Dec. 4, the paper read was on the above subject, by Mr. J. Oliver Arnold, F. C. S.

The author observed that there was a growing tendency among engineers to specify for tires, steel possessing a high resistance to tension. This was conducive to economy in wear; but it was doubtful whether such material was not more liable to sudden fracture than a more ductile, if less durable, steel. The chemical composition necessary to obtain high tensile strain, together with high elongation, was such as to render steel liable to molecular changes, which doubtless produced disastrous results. The question was rendered intricate by the fact that steel was a complex body, and that the influences of its elements upon each other, with reference to physical effect, had hitherto defied all attempts to reduce them to formulas; also by the difficulty of insuring in pieces of steel, identical in composition, a uniform and constant molecular structure. In addition to the iron, the percentage of chemical composition of normal tire-steel was, approximately, carbon, 0.28; silicon, 0.07; manganese, 1.25; sulphur, 0.08; phosphorus, 0.08. A test piece, 2 in. parallel and 0.564 in. in diameter, 0.25 in. area, planed out of a tire possessing the above analysis, would give on an average the following mechanical results, the figures being calculated on the original dimensions: Maximum tensile strain, 37 tons per sq. in.; elongation, 26 per cent., reduction of area, 47 per cent.; and fracture, gray granular, with silky edges; shape, convex and concave. Such a tire, with

an inside diameter of 2 ft. 8 in.; and a sectional area of 11 in., would behave under the falling-weight test in a manner indicated by the subjoined figures, without breaking, the weight of the tup being 22 cwt.:

Fall in feet.....	2	4	6	8	10	12
Deflection in inches.	¼	¾	1¾	3 1/16	4 11/16	6⅛

The falling-weight test might have been continued until the tire was doubled up. Such a tire was adapted to fulfill all requirements, except that it wore out in time. It was little liable to molecular change under sudden heavy and repeated shocks. In Bessemer tire-steel the carbon should lie between the limits of 0.25 and 0.32 per cent. High silicon in Bessemer steel was due either to underblowing, or to an impure manganiferous addition, and 0.2 per cent. was a dangerous amount in a tire. High phosphorus was due to the use of originally impure pig-iron, and 0.15 per cent. was dangerous. High sulphur might be due either to impure pig-irons or to inferior cupola-coke. This element, though not so influential as silicon and phosphorus, should, nevertheless, be kept as low as possible. An abnormal proportion of silicon or of phosphorus in a tire produced brittleness. All three elements were impurities, to be kept low. Suppose that it was desired to increase the tensile strain of a normal tire 5 tons, that was to 42 tons per sq. in., and at the same time to obtain without rupture the normal deflection of 2 in. per foot of inside diameter, under the falling weight; such a result could not be safely obtained by an increase of carbon, because the additional percentage of this element would render the tire liable to break under the falling-weight test before the necessary deflection had been obtained; therefore the manganese must be increased. Steel was made, having the following composition per cent.: Carbon, 0.25; silicon, 0.03, manganese, 1.75; sulphur, 0.12; phosphorus, 0.11. An ingot of this steel was hammered into a 4-in. bloom, the bloom was then rolled down into a bar, 1⅛ in. sq., from which four test pieces were turned, which yielded the following results: Mean maximum strain per square inch, 42.1 tons: mean elongation, 18.0 per cent.; mean reduction of area, 26.3 per cent. The mean result of the tests on many tires practically identical in composition, 2 ft. 8 in. inside diameter, and having a sectional area of 11 in., the weight of the tup being 22 cwt., was:

Fall in feet..	2	4	6	8	10	12	14
Deflection in inches....	1/16	5/16	1 5/16	2 3/16	3 5/16	5⅛	6¼

So far the conclusions to be drawn were that an increase of manganese produced an increase of hardness, while at the same time the tire was sufficiently tough under the impact of the falling-weight. The addition of 0.5 per cent. of manganese to the normal tire raised the strain supported from 37 to 42 tons per square inch, reduced the elongation from 26 to 18 per cent., decreased the reduction of area from 48 to 26 per cent., and required an addition of 15⅛ foot-tons to produce equal deflection. The life of a tire possessing a tensile strain of 42 tons was longer than that of one breaking under tension at 37 tons per square inch; but the former steel was much more sensitive to the influences, rate of cooling, shocks and vibration, which converted steel from a tough substance, yielding under tension a gray granular fracture, to a brittle material presenting a fracture consisting of bright crystals. To obtain such a result as a breaking-strain of nearly 50 tons, the necessary percentage of manganese would be about 2.5 per cent. No steel-maker would risk the inevitable brittleness of such a metallurgical deformity; therefore the aid of chromium had been invoked. It had been found that chromium, added in small quantities, raised the tensile strain of steel in a remarkale degree, without seriously diminishing the ductility; but that when added in a high proportion it induced brittleness. The analysis of tire-steel required to stand a strain of at least 48 tons per sq. in. was carbon, .28 per cent.; chromium, .42; manganese, 1.54; silicon, .08; sulphur, .10; phosphorus, .09. A test-piece, prepared by hammering a 14-in. square ingot down to 1¼ in. square, was turned to 2 in. parallel, .564 in. diameter, and .25 in. area, yielded the following results: Maximum tensile strain, 49.8 tons per square in.; elongation, 15 per cent.; reduction of area, 26 per cent.; fracture, flat and finely crystalline. A tire, 2 feet 8 in. inside diameter, and of 11 in. sectional area, behaved thus under a falling weight of 22 cwt.:

Fall in feet.....	2	4	6	8	10	12	14	16	18	20	25
Deflection in inches	⅛	½	1⅛	1 13/16	3 1/16	4⅜	5⅞	7⅝	9½	11 7/16	broke

A test piece, 2 in. parallel, 0.564 in. diameter, and 0.25 in. area, planed out of the broken tire, gave the following results: Maximum strain, 47.7 tons per square inch; elongation, 3 per cent.; reduction of area, 6.4 per cent.; fracture, large crystals. The molecular change set up by the shock and vibration of the falling weight was thus indicated most clearly. Tires with a strain of 50 tons per square inch, together with great strength under the drop-test, were very uncertain. The mean of four closely-agreeing tests, from pieces planed from various parts of the punished tire, of similar dimensions to the above, gave: maximum strain, 46.2 tons per sq. in.; elongation, 20.7 per cent.; reduction of area, 45.7 per cent.; fracture, granular. Thus annealing raised the ductility of steel, and caused a molecular arrangement capable of great resistance to alteration under vibration and shocks. The influence of slow cooling, on the arrangement of molecules into a form capable of resistance to rupture under shocks, was then indicated in a tabular form; also the liability of high-strain tires to assume a brittle crystalline structure, instead of the arrangement of interlaced molecules so conducive to ductility and the loss of ductility resulting from the presence of too much chromium.

From tests the author inferred that so sensitive was high-strain steel to physical change that it was impossible to get even in one bar homogeneous molecular structure. The engineer held that a certain resistance to rupture under a falling weight, together with certain results obtained on the tensile testing machine, formed a criterion of the capacity of tires to meet strains when at work. This, though true in the majority of cases, had never been exhaustively proved. When the fracture of an axle or a tire led to some fatal disaster, the engineer was to some extent called before the bar of public opinion to account for the accident. In such cases, his explanation that the breakage was due to an "original but invisible flaw" had become proverbial. An analysis and a tensile test of the broken article had been made, and the results obtained had thrown no light on the matter. But the important question with regard to the mechanical test arose: Was the test-piece planed from the immediate vicinity of the fracture? The author had obtained data which proved that injurious molecular change might be very local. Returning to the question as to how far the tests to which tires were subjected before leaving the makers' works indicated their fitness to meet strains and vibrations, he suggested an investigation upon the following lines: At the works let the tires be selected from groups made from the same blows, each group being marked with a distinctive stamp. Let representative tires from each group be subjected to exhaustive chemical and mechanical tests. Let the exact mechanical treatment from ingot to finished wheel be faithfully recorded. When the life of one of these tires was finished, either from breakage or in the natural course, let the chemical and the mechanical tests be repeated. Such a series of tests would indicate whether the influences encountered by a tire were such as to bring about molecular change. They would also show the chemical composition and the mechanical treatment most conducive to injurious molecular rearrangement, and those most likely to retain a permanently tough molecular structure.

Form for Special Report of Slid Wheels.

The following form is that referred to in a recent issue of the *Railroad Gazette* as in use on the Chicago, Milwaukee & St. Paul for special reports of wheels slid flat. It will be remembered that Mr. Barr gave the percentage of wheels removed on account of sliding, the last five years, as follows: 1884, 46 per cent.; 1885, 44 per cent.; 1886, 36 per cent.; 1887, 30 per cent.; 1888 (10 months), 12 per cent. He attributes the gain to the use of this form of report, together with close attention to adjustment of brakes.

CHICAGO, MILWAUKEE & ST. PAUL RAILWAY.

SPECIAL REPORT OF SLIDING WHEELS.

Car No......*Train No.*.....*Division*.....

arriving at.....*M*.....188.....

.....*Cond'r*.....*Eng'r*.....

had Wheels with flat spots caused by sliding, as follows:

WHEELS.		DATE IN SERVICE.	SLIDING SPOTS.			REMOVED OR PASSED.
NUMBER.	DATE CAST.		No.	LENGTH.	NEW OR OLD.	

State travel of piston in inches, when received.....; *When repaired*.....

State travel of live levers in inches, when received.....; *When repaired*.....

Was hand brake free?.....*Was air brake cut out?*.....

Were Sliding Wheels in Truck having the live lever that travels the shortest distance?.....

Did Conductor report the Wheels running rough?.....

If so, at what Station did he first notice the fact?.....

Where did Conductor receive the car?.....

State kind and number of engine and of all cars in train commencing at engine.....

.....

Remarks:.....

.....

.....*Inspector*

Paint Shop Record—Chicago & Northwestern.

The accompanying sketch shows a paint record card used in the paint shops of the Chicago & Northwestern to keep an accurate record of the painting of cars. It shows the date the paint was applied, the character of the paint and the length of time which the car has been in service since last painted. The first line gives the number of the car, and the date received for repairs. The second line gives the initia of the road to which the car belongs. The third the number of the shop in which the car is placed, and also the number of the track. The fourth line gives the date which the car was moved from the repair shop to the paint shop. Lines 5 to 18, inclusive, give the dates on which the various kinds of paint and varnish were applied. Line 19 gives the date on which the car went into service, and at the bottom, on the last line, is given the number of days the car was in the repair shop and the number of days in the paint shop.

Number,	600, 12-4-88		
Initial,	C. & N. W.		
In Shop,	12-4	Track,	5
Moved,	12-18-88		
S. A.	12-18		
S. B.	12-19		
S. C.	12-20		
S. C.	12-22		
S. C.	12-24		
St.	12-26		
Pr.	12-27		
1C.	12-29		
2C.	12-31		
3C.	1-2-89		
C. & V.	1-3-89		
1V.	1-4-89		
2V.	1-7-89		
3V.	1-9-89		
Into Service,	1-12-89		
Rep'r Shop,	14	P't Shop,	21

The dates on the card in the illustration furnish an example of the use of this record as follows: Car No. 600 was received Dec. 4, 1888; put in the repair shop on the fifth track the 4th of December; was moved on the 18th to the paint shop. On the 18th, 20th, 23d and 24th, and so on up to Jan. 9, various coats of paint and varnish were applied of the brands indicated in the first column. Finally on Jan. 12 the car went into service again, having been fourteen days in the repair shop and twenty-four days in the paint shop.

These cards when properly filled out and filed furnish a complete record of the brands of paints and varnishes used and the dates on which such coatings were applied. When a car comes in to be repainted, the records are searched to see if any peculiarities, such as cracking or scalding or dullness of varnish can be explained. The use of such a system has enabled the Chicago & Northwestern to make a practical and accurate test of the various brands of paint and varnish. This in connection with the chemical laboratory tests furnishes data to determine what are the desirable and what the undesirable components in car paints and varnishes. Special memoranda are made on the back of the card, which is left blank for that purpose.

THE SCRAP HEAP.

Notes.

At Sherman, Tex., a jury has given a man $100 damages for bruises received by lumps of coal thrown at him by the engineer and fireman of a passenger train. It appears that the plaintiff reached the station in Sherman just as a train was starting out, and found it necessary to get on the front end of the baggage car in order to avoid being left. The engineer and fireman espied him, and, taking him for a tramp, abused him as above mentioned; although he waved his "gripsack" and ticket at them to show that he was a passenger. They continued their shower of missiles until the train had run several hundred yards and made a crossing stop, when the man got off.

The officers of the Berkeley Park Motor Line at Denver, Col., have been brought into court on a charge of manslaughter, in consequence of the derailment of a car on the company's street railroad, February 3, which resulted in the death of two passengers. The car was run by a small steam engine inside of it, and had no brake. It attained a speed of some thirty-five miles an hour on a steep down grade, and the engineer in trying to control the speed by reversing (the usual manner) blew off the steam-chest cover.

Treasurer W. A. Leete, of the Providence & Worcester, recently received $47.19 in payment of a freight bill of $16.50 (and interest) for the transportation of 44 barrels of apples in December, 1857, the money being voluntarily brought to him by an old man of 70 years, whose conscience had troubled him ever since the original transaction.

Dr. W. Seward Webb, President of the Wagner Car Co., has gone on a trip in his private train, which will be one of the longest of the kind ever made. Dr. Webb takes his two special cars, together with a dining and a combination baggage and parlor car, making a train of 4 cars, which will be occupied by Dr. Webb's family and guests to the number of 10, who, with 15 servants, will make up a party of 26. The route is to Niagara Falls, Denver, El Paso, Vera Cruz, Los Angeles, Portland, Or., Helena, Mont., Winnipeg, Vancouver, and thence back to New York. A stop of a month will be made in Southern California.

Kansas has passed a law imposing heavy fines on railroads which do not comply with the Railroad Commissioners' orders, concerning the establishment of new stations, side tracks, etc.

The B. L. E.

The *Locomotive Engineer*, referring to Philadelphia reports of weakness in the Brotherhood of Locomotive Engineers, says that that body

"Is not dead enough for a funeral; its liver is out of order, and it suffers a little from water on the brain and enlargement of the gall. What the order needs in general, is a healthy revision of the by-laws, the abolition of grievance committees, more statesmanship and less representation in convention, and convention dates further apart. The individual members need a bath in a liniment composed of equal parts golden rule, brotherly love, devotion to duty, and that kind of manhood that insists on furnishing first-class work for first-class pay, and in being their own judges as to what they shall and shall not belong to. The lodges need fewer factions and more valve motion models; less discussion about men and more about things; less jealousy of others, and more reliance in self, from a knowledge of superior information received in the lodge room discussions on engine running, firing and general railroad work."

RAILROAD GAZETTE

Published Every Friday,
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EDITORIAL ANNOUNCEMENTS.

Contributions.—*Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and in their management, particulars as to the business of railroads, and suggestions as to its improvement. Discussions of subjects pertaining to* ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

Advertisements.—*We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay,* EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and those only, and in our news columns present only such matter as we consider interesting, and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially, either for money or in consideration of advertising patronage.*

The conference of State and Inter-state Commissions at Washington this week was largely attended. There were present 39 representatives, from 20 states, the full board of Inter-state Commissioners, and a large committee from the Association of Accounting Officers. All sections of the country were well represented—those states in which recent legislation has been most radical, as well as those in which the policy in dealing with questions of state contro of the railroads has been most conservative.]

A decidedly moderate and reasonable temper marked the whole discussion. The subject of legislation was, however, barely touched. A committee was appointed to consider the matter of harmonizing the railroad laws of the states, but no further immediate action was taken. The most careful and the most important action was on the subject of uniformity in railroad reports and statistics. This matter was referred to an able committee, which spent many hours in hard work over it, assisted by many of the members of the Association of Accounting Officers. The report of this committee recommends that the railroad year for state and inter-state reports shall end on June 30, and proposes several changes in the Inter-state Commerce Commission's form of report. These changes are intended to elicit more precise information as to ownership and methods of accounting, particularly in the matter of floating debt. The subject of uniform classification of freight was passed over with no action other than the adoption of a resolution which really means that the commissioners, as a whole, understand that the subject is too large and too complex to be settled by any hasty or arbitrary action. The official expression of this feeling is an important step and must have a good effect on public opinion. Probably the best results of the conference, as is usual in such meetings, will find no expression in the published proceedings, but will appear in the future work of the various boards. These are the results which come from learning how much weight there is in the other man's opinion on the question.

The dangers of the car stove and the general subject of train heating have been brought into special prominence by three notable train accidents within a fortnight, and the predictions that the present winter would not fail to afford a sufficient number of emphatic illustrations of the necessity for safer heating are verified. The derailment at Roaring Branch, Pa., on the Northern Central, and the collision on Boyd's Siding, Me., on the Maine Central, both occurred on Feb. 23. A car of the Northern Central train fell down a high bank and was overturned twice, but there was no fire; it was heated by the Martin system, and the passengers, although seriously injured, escaped alive. The number hurt is reported as 11. The Maine Central train was derailed by a misplaced switch, while running some 30 miles an hour, and crashed into a carload of hay on a side track. The mail and baggage cars were wrecked, and immediately took fire. The fireman and two mail clerks were pinned down and burned to death, and two other trainmen were injured. The switch was doubtless left wrong by car repairers, who were at the station putting a new truck under a freight car. The temperature was below zero, and there was a high wind, so that the engineer was blinded by snow and could see but a short distance ahead. The origin of the fire which consumed the wreck is attributed by some reports to the fire in the engine, and by others to the fire in the stove of the mail car. The train was fitted with the Sewall continuous steam heating apparatus, but the mail clerks had built a fire in their stove for cooking purposes. It is said that the use of this stove was in violation of orders. One of the mail clerks is reported, however, as saying that the fire was built because it was an exceptionally cold day. Another account states that, in consequence of a defective coupling on a foreign car (probably meaning the Pullman), the steam apparatus was not in use; and in connection with this it is reported that the Pullman car, usually run at the rear, was placed next to the baggage car. It is added that the force of the collision was very severe, and that, if the common passenger cars had been in front of the Pullman, they would very likely have been crushed. The third accident was at St. George, Ont., on the 27th inst., and is described in another column. In this case there was no injury to persons by fire, but the stove in the dining car was violently thrown from one end of the car to the other as the latter fell off the bridge.

These events are serious and suggestive, but it is by no means certain that they warrant the action desired by the petitioners who have asked for a compulsory heating law in Maine, or the passage of the bill introduced in the Legislature of Pennsylvania. Massachusetts has been in the front rank among enterprising states in this respect, and the Commissioners of that state are now inclined to regard compulsory legislation as unnecessary. The activity of many of our enterprising roads is certainly great enough; in fact, the opinion has been expressed that some are going forward too fast. The result on the Northern Central speaks for itself. The Maine Central has used the Sewall system so long that no one questions its disposition to make the car stove "go." If, as from the reports seems possible, the continuous system was out of use at the critical time by reason of a defective coupling, the lesson to railroad officers needs no elaboration. The frequency of similar occurrences in other departments is known to every one, and the other roads which have adopted continuous systems—even those which have equipped all their cars—can doubtless tell of numerous difficulties of this kind, even after the most painstaking care. The dining car stove has been regarded as the one danger that could not be eliminated from a through train; but the St. George disaster, although no one was burned in it, warns us to cook our steaks by steam if there is any possibility of doing so.

The communication from "Track Foreman" which appears in another column gives some definite statistics of broken rails drawn from the experience of one of the great western roads. It appears that the failures are distributed as follows:

	Per cent.
At end of rail, split or defective	50
At first bolt hole	25
At second bolt hole	15
At other points	10
Total	100

Ninety per cent. of all breaks are found at the second bolt hole, and between that and the end of the rail; and the roadmaster says that over 80 per cent. broke within 12 in. of the end of the rail. Much the larger part of the broken rails are split, and our correspondent says that "none break vertically between the bolt holes." These facts are not extraordinary. They probably represent pretty closely the general experience. For this reason they give all the more significance to the recent discussions of the methods of manufacture of rails. It is quite evident that in "Track Foreman's" experience defective ingots and insufficient working are responsible for most of the most dangerous defects found in rails; and he confirms also the experience of various other recent observers that a big head does not wear so well as one that has been worked down to a smaller section. It is noted that the cracks in the split rails are often larger in the interior of the head than at the surface. If the reader will look back at the defective sections shown with Mr. Whittemore's paper in the *Railroad Gazette*, Jan. 25, and in that of Capt. Hunt in the issue of Feb. 15, he will see striking examples of the way in which these cracks originate. The natural deduction from the evidence presented in those papers, and in the communication in this issue is quite obvious. A crack in a rail may be developed by too great a pressure per unit of surface, as Mr. Whittemore suggests, but the ultimate cause of the failure must be traced back to the mill. Whether or not the remedy for this class of failures is to be found in cooling the ingot on end and cutting off more of the top, or in designing sections so that a smaller percentage of the metal shall be included in the head, or in making the rail top flat so as to distribute the wheel pressure over a greater area, we cannot pretend to say. Probably all of these conditions must be observed if we would escape split rails; and some of them will, without doubt reduce the wear from abrasion.

It is gratifying to learn that the Wagner Company is to apply the Westinghouse six-wheel brake rigging to eight cars now building to run in the limited trains of the New York Central. This brake gear was shown in the *Railroad Gazette*, June 1 last, p. 346, and has undergone considerable experimental service within the last six months. The importance of applying brakes to all the wheels of the very heavy cars running in the fast trains cannot be over-estimated. A great deal is said about the increased duty put upon bridges, permanent way and running gear by the present heavy loads and high speeds, but much less is heard of the increased duty required of brakes under the changed conditions. We lately heard of a case in which a heavy "limited" train, going 50 miles an hour, ran about 2,000 ft. after getting an unexpected signal to stop. Had the brake gear been in proper order this would not have happened, and had brakes been applied to 12 wheels of each car, instead of to eight, the stop would probably have been made within 800 ft. The Westinghouse people are urgent in recommending the use of the six-wheel brake rigging, stiffer beams and better foundation rigging generally; and they have, moreover, increased the diameter of the brake cylinders for heavy coaches.

A writer, signing himself "Vulcan," has a communication in the *Locomotive Engineer*, concerning the difficulties of using torpedo signals. Referring to the rules of one of the trunk lines, which require that, whenever a train is detained on the road, or is compelled to stop at a station longer than the usual time torpedoes must be placed, etc., and that engineers must come to a full stop when encountering a torpedo, "Vulcan" instances an actual case of a local freight running ahead of a through freight, and having a large amount of work to do at each station. Torpedoes must be put down at nearly every station, and 30 torpedoes (representing 10 stops, 3 torpedoes being placed each time) have been found by a following through freight within 30 miles, and that without once seeing the local. A full stop with a very heavy freight train uses up much time, of course. The writer concludes that a literal compliance with the rules produces delay and increases danger. A second through freight train is delayed by the first, and infinite possibilities of danger come in. He continues:

> "No one will attempt to say that a torpedo conveys any further information than the fact that some one, presumably the flagman of preceding train, has placed it on the rails; but when it has spoken once, and told you that, it ceases to give you information, unless telling you what your time table has already told may be called information. That (if you consult it) will have informed you that other trains are ahead of you on the road. In regard to the distance which the preceding train is ahead, or the time which has elapsed since the torpedo was placed on the rail, you cannot get an answer, and as these—the most important points—are left in doubt, what good does it do to tell the other fact, which all hands were fully aware of?"

"Vulcan" suggests as a remedy that extra trains always place torpedoes on the left-hand rail; regular trains use one torpedo to indicate that they are 15 minutes late, two torpedoes 30 minutes, three, 45, and so on.

It is much easier to state this difficulty than to discover and apply the remedy. One of the inconsistencies of the rule quoted by the above writer is the requirement that when a train "can proceed only at a slow rate of speed" the flagman shall go back "instantly." The brakeman who can decide just how much the speed must have fallen off before this rule ought to apply, can draw a line between daylight and dusk, or separate the passenger expenses of a railroad from those chargeable to freight. The uniform code does not attempt to grapple with this problem. Even the phrase "any of its usual stops," has an obvious element of weakness in it. That torpedoes must be used if trains are run under present systems, all are agreed. That one of their most important uses is lost if they are taken up when the man goes in is admitted by all who carefully consider the matter. How to leave them down and yet not hinder trains is a hard question. Runners who encounter a great many torpedoes are

almost sure to lose their respect for them. The Erie provides that the runner need not obey the indication of torpedo signals after passing one mile beyond them. This is much better than no limit, but even this would often delay heavy trains in just the manner described in the letter. The fact is that none of the rules make perfect provision for a local freight which makes long stops at nearly every station. Either the local runs some risk or else the following through train is hindered. Probably the best plan for protecting a local freight (without the use of the telegraph) is to make all trains, except regular passenger trains, approach yards under control, and to have this rule apply to every station where the local is liable to stop. Heavy through freights will even then have to slacken speed many times, but they will have to do it always under the same circumstances and at the same places, so that the conditions will be better understood and provided for. But the simplest way to avoid all these troubles is to employ the block system. In fact, the high-speed freights now becoming common on many roads, make the block system a necessity at night, in stormy weather, and on curves, unless greatly increased risks are to be permitted. The running of trains at widely varying rates of speed constitutes one of the principal factors which determine the necessity of blocking. The requirement that slow trains shall make way for the faster ones has served for half a century, but only at the sacrifice of a large percentage of the time of the slow trains. The increase of traffic keeps this percentage constantly growing.

The high reputation which the Massachusetts Railroad Commission has enjoyed since its first organization is well maintained by the twentieth annual report which has just been issued, and is summarized on another page of this paper. The moderate and judicial temper exhibited in the views and decisions uttered, while still urging all possible progress in vital reforms, is no less marked than the sagacity with which original information is sought out. The engagement of Professors Swain and Lanza for special investigations at home has been supplemented by the valuable paper on German practice by Prof. Goering, of Berlin. This paper, which is briefly touched upon in the Commissioners' report, we hope to refer to more particularly hereafter. Massachusetts deserves the credit, too, of setting forth facts in a clear light. Both this report and the report of the special commission to investigate grade crossings are accompanied by numerous finely-executed heliotype views of stations and crossings, which, with the elaborate diagrams, must be peculiarly effective for the purpose for which they are intended. The object of the clear and forcible arguments of both reports is to convince the members of the legislature of the necessity of passing certain laws; but the average legislator is often perversely indifferent to the clearest and most forcible rhetoric, and the aid of photography as an advocate will be valuable. It is perhaps ungracious to make these reflections with reference to a state whose law-makers have passed so many sensible laws on railroad matters, and so few vicious ones; but the pictures will make the argument none too strong; the problem presented is a large one. The Commissioners had probably not seen the report of the special commission, and they discuss the same subject—highway grade crossings—at considerable length. Prevention of accidents with the crossings in their present condition and the desirability of more effective laws constitute the main themes, however, while the special commission spoke wholly of the problem of abolishing the crossings.

The facts given in Professor Goering's paper in the Massachusetts report illustrate a phase of railroad economy that has been noted elsewhere than in Germany, to wit, the fact that railroad directors are not unmindful of the claims of humanity when once those claims are clearly set before them. Corporations have no souls, it is true, but directors' lack of intelligence and enterprise is not from lack of a soul so much as want of information. The point we refer to is the improvement of German railroad stations since 1883. In that year occurred the terrible slaughter of some 40 people by an express train plowing through a crowd which was rushing across a main track at a station. This catastrophe happened at Steglitz; and Steglitz is the very place now taken as an example of the best arranged station. Fences between main tracks and overhead and subterranean passages are now provided to perfection; but a year before the accident the appropriation for the improvements was refused by the body controlling the finances of the Government railroads. The same locking of the door after the theft of the horse has been observed here. A road having a terrible collision spends liberally for signals; one having a horrible bridge disaster thereafter pursues an enlightened policy in the bridge department. An officer who has seen poor passenger cars crushed in collisions, opens his eyes to the necessity of strong frames. Another becomes enthusiastic in another direction and overlooks the value of stout cars. Those, of whom there are many, who prudently learn from others' experience, are of course excepted from this reference to the "average road." And yet, the mere financial loss or gain seems hardly an adequate explanation for such marked differences in policy. The loss from defective bridges is probably no heavier in the long run on the road which has a great disaster than on others *pursuing the same policy* whose bridge failures are less startling. Expensive signals would doubtless be just as valuable on a hundred other roads as upon that one which has been scared into adopting them by a $500,000 collision. There would seem to be a definite duty incumbent upon general managers and superintendents to see that directors duly realize the true needs of their roads. The doctrine that a director should be chained to the pilot of each engine is a piece of barbarous "humor"; but it has its grain of truth, and officers who know the dangers of the men who do ride upon the pilot (or in a more dangerous situation) should exert such power as in them lies to convey that knowledge to the directors.

The report of the Pennsylvania Railroad is always interesting. It deals with a wider range of traffic than that of almost any other company, and affords an important index of the real situation of the better roads of the country. The results are not very encouraging. The great gain of 1887 has not been repeated. The Eastern lines have just about held their own; the Western lines show a net loss of over a million dollars. If we compare the aggregate on all lines for three years, we have the following figures:

	1886.	1887.	1888.
Gross earnings.....	$101,697,980	$115,515,506	$116,509,292
Operating expenses...	67,102,714	77,238,082	80,737,335

The net earnings are absolutely a little larger than they were in 1886; the percentage to gross earnings is much smaller. The percentage of operating expenses has in fact increased from 66 in 1886 to very nearly 70 in 1888. Nor does this appear to be the result of extraordinarily high maintenance charges. A good deal was expended under this head in 1887, but the indications are that the high relative expense in 1888 was due to other causes. The first important cause to be noticed is the relative loss of through traffic. In 1886 the proportion of through tonnage on lines east of Pittsburgh and Erie was 13.96 per cent. In 1887 it was 19.55 per cent.; in 1888 it was only 11.87 per cent. In the last year, the through tonnage showed an absolute as well as a relative diminution.

In spite of this change, the average length of haul is rather greater than it was in 1886, but not quite so large as it was in 1887. The enormous through traffic on lines west of Pittsburgh in 1887 has been lost. On these lines, an increase of tonnage is combined with a decrease of ton-mileage. In 1887 these lines carried 33,772,120 tons an average distance of 104 miles each; in 1888 they carried 34,834,171 tons an average distance of only 97 miles each. Apart from any question of high or low rates, this is enough to account for a decided change in various items of operating expense.

It is a delicate matter to decide how far the present unfavorable turn is due to business conditions, and how far to legislation. The report does not pretend to give an opinion on that point. But it is significant that the Pennsylvania system, which was expected to be placed in the best relative position under the Inter-state Commerce law, should have lost quite as much as it gained. The Pennsylvania has had little faith in pools; but it feels their absence. Though its traditional policy has for a long time been in conformity with most of the requirements of the act, it cannot escape the burdens which the act imposes. After reading this report, we may well ask, "If these things be done in the green tree, what shall be done in the dry?"

Woolfe Double Expansion Locomotive.

In another column we illustrate a double expansion locomotive, with which some experiments have been made, on the Northern Railroad of France, that are interesting in the bearing they have upon American locomotive service. This locomotive is a powerful machine, and not a small experiment. It weighs 113,000 lbs., and all of this weight is available for adhesion. There are not many locomotives more powerful than this, even in American service. It is, in fact, a modern locomotive in the full sense of the word even to the extent of double expansion.

The experiments were first conducted with a single expansion engine, which, in its valve gear and steam distribution, was not unlike American locomotives. Subsequently this engine was changed to a double expansion engine by putting two cylinders tandem on each side of the locomotive, the low-pressure cylinder being placed in front. The regulation of steam was governed by a valve, which, although complicated in its structure, had almost exactly the same action as those attached to the valve motions in use in the United States at the present time. That portion of the valve which regulated the admission of the high-pressure cylinder was precisely like the common D valve. That portion of the valve which regulated the admission of the low-pressure cylinder was similar to the Allen-Richardson valve. The results of the experiments made throw some light upon the best obtainable steam distribution with the Stephenson link gear.

American locomotive builders have been inclining towards the larger admission ports, long valve travel and an amount of outside lap only limited by the maximum power needed in starting long trains. As an illustration of the action of such designs we have here a locomotive which was constructed on this plan, and also indicator cards, showing the effect of such designs on the steam distribution. We refer now, principally, to the high-pressure cylinder. This cylinder is about 15 in. in diameter—the length of the admission port is 17¾ in. at the valve seat. The width of the ports is $\frac{1}{3\frac{1}{8}}$ in. The outside lap is $1\frac{3}{16}$ in. There is no inside lap. The steam passages of the high-pressure cylinder are narrowed between the valve seat and the interior of the cylinder, in order to reduce the per cent. of clearance, but this in no way interferes with the distribution of the steam at the short cut offs, which is the point we are now considering. This design may be considered the extreme with respect to large ports, long valve travel and outside lap. An inspection of the indicator cards shows that the admission of steam to the high-pressure cylinder, at a medium speed, was considerably "wire-drawn." The line of compression on these cards, taken from the high-pressure cylinder, indicates that there is, in spite of the length of travel and outside lap, too much compression at the shorter cut-offs.

These results will go to show how little gain in area of indicator card is to be obtained from an abnormal increase of the length of the port where the valve operation is regulated by the Stephenson link motion.

It is doubtful if, previous to this time, ports as long as 17¾ in. have ever been used in connection with a 15 in. cylinder and less wire-drawing than is here shown might have been expected from such dimensions. We have long claimed, however, that a small fraction of increase of width of port opening, during admission, was far better than considerable increase of length of port opening. This is the result of a study of the passage of air, and other gases, through gratings, wherein it was found that long slits offer nearly as much resistance as small square openings whose dimensions are the same on each side of the square as the width of the slits. It was further found, in experimenting with air passing through contracted openings, that a slight variation in the width of the slits, accompanied by a contraction in the length, which contraction maintains the total area of the opening constant, produced a marked decrease in the resistance to the passage of air.

If master mechanics would obtain accurate records from the special designs which they construct, they would learn the true value of such designs. As an illustration of this, we know several cases where 18 in. ports are used on the eight-wheeled type of engine with a valve travel of 5½ in. and an outside lap of 1 in. No indicator cards have been taken from those engines, but there is a report that they are "smarter" and are much superior to those of the same design otherwise, but having 16 in. ports. It would appear, however, from the results of the experiments with the valve gear above mentioned, which are in every way comparable, that little or no advantage is obtained by the use of the longer ports.

This is a subject well worthy of our consideration and we find that several railroad mechanical departments are at work upon this problem. Mr. Twombly, of the Rock Island, has been investigating for some time past the effects of long outside lap on the steam distribution and compression. The experiments are made with both the indicator on the locomotive, and with a valve model in the office. The problem of increasing the power of locomotives at the shorter cut-offs is being brought forcibly before railroad men at the present time. It is not a simple matter to increase the power when the link block is near the

centre of the link, and the locomotive is traveling at a high speed.

The table showing the comparative losses due to wire-drawing, insufficient expansion and clearance spaces, is compiled from measurements taken from the indicator cards. While this method does not show the total losses resulting from these detrimental actions, it does show a portion of the losses, and is the only readily available means of ascertaining their amount. In this instance the clearance space in the passage to the small high-pressure cylinder was over 15 per cent. of the total volume of that cylinder. This is the largest percentage of clearance we have yet seen for a locomotive of this power. A few American locomotives, however, have 10 per cent., but this is uncommon, the average being about 8 per cent. The results of the measurements and comparisons shown by the table show clearly the direct loss caused by clearance when the compression is not carried up to the pressure of admission before the valve is opened.

An error is made, however, in considering that the losses are removed when the pressure of compression is carried up to that of admission. One of the most serious losses of all is the result of the actual presence of the walls lining the passages leading to the cylinder. The detrimental effect of these walls is in proportion to their area and not to the volume of the passage. To render this clearer it must be remembered that before the valve shuts off the admission of steam to a cylinder there is admitted into that cylinder a much larger volume of steam than the pressure, shown by the indicator card, and the volume of the cylinder accounts for. This is estimated, variously, from 20 per cent. to 50 per cent. more than is shown by the area of the indicator card, and the most recent experiments at the Massachusetts Institute of Technology, and those experiments made on electric lighting plants, fully substantiate these figures. This shrinkage in steam volume is caused by the contact of the steam with the walls of the cylinder which have been previously cooled by the exhaust steam, and the greater the area of these walls in proportion to the volume of steam, the greater will be the shrinkage. It is easily seen that a long steam passage has far more surface, in proportion to its volume, than the same volume in the cylinder itself.

The table is incomplete in not showing the value of the detrimental effect of clearance at its true magnitude.

One of the most curious results of the comparisons of the indicator cards is an almost indisputable proof that it is more economical to run a locomotive with the throttle than with the reverse lever under certain conditions. This is in direct contradiction to the directions given in several hand books on the locomotives which are offered to American enginemen. This advantage of running with the throttle is not so much the result of a more satisfactory character of the admitted steam (such a claim might be made on good grounds, in the light of the latest developments in steam engineering), but rather the result of the use of a valve gear which does not operate well under certain conditions. It is one of the traditions of a round house that each locomotive has its "best points" for the throttle and reverse lever to pull fast heavy trains, and it would seem as if there was, even yet, science in the locomotive runner who governs the compression by the reverse lever and the steam admission by the throttle, when he has to run to make up time.

Deductions based upon indicator cards are at the best but comparative. No absolute data can, from them, be determined except the variations of pressure in the cylinder. Yet, as far as they go, they are very useful as a guide in selecting details of designs, when the effect of the designs upon the indicator cards can be anticipated. A most instructive table of results of calculations based upon indicator cards, taken from the locomotive herein mentioned, is given in this issue. The advantages of a more extended expansion are well shown to be great even when the reduction of cylinder condensation is not considered.

The moment diagrams, given in connection with the illustration of the double expansion locomotive, call attention to the errors in the common rule of comparing the weight and cylinder capacity of locomotives on a basis of a fixed per cent. of the admission pressure. Such a comparison is only of value when the fixed percentage of the pressure of admission happens to be such as to give a correct result. The only accurate basis for a satisfactory computation of the amount of cylinder capacity needed to furnish sufficient power to utilize the whole adhesion of the drivers is the information derived from construction and close inspection of a diagram of moments such as we illustrate in this issue. They are easily constructed, and when properly interpretated show exactly the power of the cylinders and their ability to drive the wheels at any cut-off. Another point well illustrated in the results of these experiments, is the necessity of a different proportion between the capacity of the large and small cylinders for locomotives which are to be worked at different velocities; thus the high-speed locomotive must have a different ratio of cylinder capacity from that of locomotives which are used for slower service.

Many other deductions from these tests present themselves, but lack of time and space prevent further consideration of this locomotive in this issue.

Changes in the Inter-state Commerce Law.

The amendments to the Inter-state Commerce act (printed in full on another page), are not very radical; but as far as they go they are extremely well devised.

The most important changes are those in sections 6 and 10. We find (1) a provision that tariffs shall not be reduced without three days' notice; (2) a series of detailed arrangements for full publication of joint tariffs; (3) the addition of imprisonment as a possible penalty for officials in flagrant cases of discrimination; (4) a provision to hold shippers as well as railroad agents liable for false description of goods, and making it a criminal offense to give a railroad agent pecuniary inducements to violate the law.

Most of these points are well covered by the Inter-state Commerce Commission in a letter (which we print elsewhere) to the Conference Committee through whose agency the amendments were passed. To their arguments we need add but little. The advantage of holding the shippers responsible for frauds from which they derive the chief benefit, is obvious enough. The attempt to put a heavier personal pressure on reckless railroad agents, by the possibility of imprisonment, may not meet its objects; but it is well enough to try it. It cannot hurt honest or responsible men; the only question is whether it can reach dishonest ones. The requirement of three days' notice for reductions in rates has been much discussed; the general sentiment seems to be in its favor. At present ten days' notice is required for an advance, but none whatever for a reduction.

The other changes deal with matters of detail. Section 12 is so amended as to define more accurately the powers of the Commission in compelling the presentation of evidence. Section 14, in its new form, sanctions the arrangements for printing opinions in the same way as is done by the regular courts. Section 16 is so amended so as to prescribe and legalize the procedure of the Commission in cases requiring trial by jury. The change in section 17 is merely nominal. The amendments to section 18 removed the Commission's dependence on the Secretary of the Interior, and make it, in form as well as in fact, an independent body. All these things emphasize the change in the character of the Commission as compared with what was originally expected. It is no mere administrative body; it has become a court. The law is simply conforming to the facts of the case, and giving the Commission powers which it has earned– many of which it has practically assumed in advance of distinct legislative authority.

Section 22 is changed so as to provide more specifically for the right to make reduced rates for certain classes of indigent persons; but nothing is added which might not perhaps have been allowed under a very broad construction of the language of the original act. Two additional sections make it more clearly the duty of the Commission and the United States authorities to take action in cases which might otherwise have been left to their discretion.

The amendments are quite as noticeable for the ground which they do not cover as for that which they do. They do not bring water routes or express companies under the same control as railroads. They do not endeavor to define through routes more accurately, or to enable one carrier to compel others to enter into through arrangements. Some changes of this sort might have been wise; but on the whole we think it was quite as well not to undertake too much work of this kind. An amendment to a law is apt to open more points than it settles, and the work of interpreting the Inter-state Commerce Law and adapting ourselves to its provisions will probably go on more readily if comparatively few changes are made in the substance of the act.

A correspondent of *Bradstreet's* reports an Iowa grievance as follows: "A house in Dubuque sold a dealer in Vinton a carload of goods upon which he agreed to pay the excess of the freight from Dubuque to Vinton over what it would have been from Chicago to Vinton. This excess amounted to $19.26. The freight paid on this carload from Chicago to Dubuque amounted to $62.84, making a total difference from Chicago to Vinton via Dubuque of $82.10 in excess of the rate from Chicago to Vinton direct, notwithstanding the fact that Dubuque is considerably nearer to Chicago than Vinton is."

This is hardly a fair statement of the Iowa situation. Vinton is on the Burlington, Cedar Rapids & Northern which, as its name implies, is a road having Burlington and not Dubuque as its Iowa terminal. Hence a shipment from Dubuque to Vinton would be subject to two local tariffs and the total would undoubtedly be a high one comparatively. The railroads cannot be blamed because all roads do not radiate from Dubuque or any other Iowa city. Again, $62.84 seems a larger sum for transportation between Chicago and Dubuque than the Dubuque merchant need have paid. The rates between these points are, on traffic from the seaboard, 27, 23, 19, 14, 11, 9, governed by Official classification; but when shipments originate at Chicago, the rates are 46 37, 29, 20, 15, governed by Western classification. This is certainly more favorable to Dubuque than perhaps is fair, and if any city could complain it would be Chicago. It looks as if the Dubuque jobber referred to did not know how and where to buy his supplies. Let us take a shipment of dry-goods sold in the Waterloo (Iowa) section The account would stand:

Chicago to Dubuque, 1000 lbs. @ 27c	$2.70
Dubuque to Waterloo 1000 lbs. @ 25c.	2.50
	$5.20
Chicago through to station near Waterloo, 1000 lbs. @ 60c.	$6.00
Or to Waterloo proper, 1000 lbs. @ 50c.	$5.00

We do not see how any Dubuque merchant in fairness could complain of this. The sum of the locals through the Dubuque jobber, is less than the through rate, or at least no more.

The Pennsylvania Annual Report.

Financial results are as follows:

Main Line and Branches (Philadelphia to Pittsburgh):	1888.	1887.
Earnings	$36,698,183	$35,305,728
Expenses	23,526,578	22,328,536
Net earnings	13,171,605	12,977,192
Interest received	4,714,537	5,162,808
Total income	17,886,142	18,140,000
Interest, etc., paid	7,916,480	7,698,714
Net income	9,969,661	10,441,286
Philadelphia to New York and Branches:		
Earnings	17,100,851	16,328,653
Expenses	13,071,485	12,301,000
Net earnings	4,029,365	4,027,652
Interest received	699,896	532,102
Total income	4,729,262	4,559,754
Interest, etc., paid	4,889,763	4,787,745
Net loss	160,500	227,990
Aggregate net income balance	9,809,160	10,213,295
Expended for extraordinary repairs, etc., not chargeable to capital account	1,161,547	1,241,115
Advanced to Pennsylvania Company and chargeable to income	1,020,000	.....
Other payments from income	.....	342,183
Sinking funds and guarantees	586,651	846,258
Dividends	5,327,270	5,418,701
	(5 per cent.)	(5½ per cent.)
Sundry accounts	93,272	381,437
Surplus for year	1,620,421	1,983,599

Gross earnings have increased, but expenses have increased by just about the same amount. Interest receipts are somewhat less this year than last. The greatest loss was in the expenditure of over a million dollars to meet deficiences on Western lines. This was partly, but not wholly, balanced by a reduction in the amount of extraordinary accounts settled out of income. Both the dividends and the surplus are, therefore, somewhat smaller than last year.

The total amount expended on capital account in 1888 was $3,887,403.

There were built at Altoona, and other shops east of Pittsburgh and Erie, for the main line and other roads of the system, on capital and repair account, 125 locomotives, 46 passenger cars, 11 baggage and mail cars, 2,807 freight cars, and 120 cabin and maintenance of way cars.

Under the Car Trust system a further issue of $3,000,000 of four per cent. certificates was authorized. Under this authority, and that heretofore conferred, there were furnished during the year 100 box, 6 refrigerator, and 2,000 hopper gondola cars for the main line, 500 long gondolas for the lines in the system west of Pittsburgh, 500 long gondolas, subleased to the Northern Central, 500 long goudolas, subleased to the Philadelphia, Wilmington & Baltimore, and 500 hopper gondolas, subleased to the Bell's Gap Railroad.

The condition of the car trust account may be summarized as follows:

Total cost 46,482 cars		$23,887,000
Amount of certificates redeemed to Dec. 31, 1888:		
Amount paid in full payment of 15,714 cars.	$8,337,000	
Amount paid on account of 30,768 cars.	5,325,000	
		$13,662,000
Balance of certificates outstanding Dec. 31, 1888.		$10,225,000

Financial results on other divisions are as follows:

Philadelphia & Erie.

	1888.	1887.
Earnings	$4,373,042	$4,036,931
Expenses	2,733,088	2,457,047
Equipment interest	168,403	167,341
Net earnings	1,471,550	1,412,542

All of which is payable as rental, and does not affect the financial statements of the Pennsylvania Railroad Company.

Lines West of Pittsburgh.

Operated by Pennsylvania Co.	1888.	1887.
Earnings	$19,579,177	$20,784,403
Expenses	13,016,817	12,859,423
Net earnings	6,562,360	7,924,979
Rental, interest, etc	6,637,251	7,249,463
Net result	— 74,890	+ 675,516
Operated by Pitts., Cin. & St. Louis.		
Earnings	7,821,283	8,286,254
Expenses	6,151,580	5,859,199
Net earnings	1,669,703	2,427,054
Rental, interest, etc	1,746,218	1,902,384
Net result	— 76,515	+524,670

Operated through their own organization, the Pennsylvania railroad having one-half interest in the financial result, are the Chicago, St. Louis & Pittsburgh, and roads operated through its organization; St. Louis, Vandalia & Terre Haute; Grand Rapids & Indiana and roads operated through its organization; East St. Louis & Carondelet; Cincinnati & Muskingum Valley, and the Waynesburg & Washington.

	1888.	1887.
The aggregate gross earnings	$10,493,908	$11,253,841
Expenses	8,219,986	7,913,035
Net earnings	$2,273,923	$3,340,806
Deduct rental and interest	2,311,401	3,184,251
Loss.	$37,478	$156,554*
Of this the Pennsylvania R. R. Co., under existing contracts, is responsible for	$18,739	78,277*
Which, added to the loss shown in the above statement	151,406	1,200,186*
Leaves a net loss on all lines west of Pittsburgh for 1888	$170,145	$1,278,463*
Net profit on all lines west of Pittsburgh for 1887	1,278,463	.....
Showing a comparative decrease for 1888, compared with 1887, of	$1,448,609	.....

*Profit.

Aggregate results are as follows:

	1888.	1887.	Inc.
Gross earnings from traffic, all lines	$116,509,293	$115,515,506	$993,786
Gr's exp., excluding rentals, interest, dividends, etc.	80,737,336	77,238,082	3,499,253
Showing net earnings	$35,771,957	$38,277,424	D. 2,505,467

FREIGHT TRAFFIC.

	1888. No. of tons.	1888. No. of tons one mile.	1887. No. of tons.	1887. No. of tons one mile.
Lines east of Pittsburgh and Erie	78,512,723	7,114,512,509	72,353,035	6,415,642,576
Lines west of Pittsburgh	34,834,171	3,388,670,389	33,772,120	3,506,124,458
Totals	113,346,894	10,503,182,898	106,128,215	9,922,067,034

PASSENGER TRAFFIC.

	1888. No. of passengers.	1888. No. of passengers one mile.	1887. No. of passengers.	1887. No of passengers one mile.
Lines east of Pittsburgh and Erie	58,924,787	1,049,909,660	54,733,927	1,014,127,707
Lines west of Pittsburgh	15,075,299,	413,630,338	13,419,778	368,645,197
Totals	74,000,086	1,463,539,998	68,153,705	1,382,772,904

The results of operations per ton-mile and per passenger mile on the Eastern lines are given in the following tables:

	Average freight earnings per ton per mile, cents. 1888.	1887.	Average cost per ton-mile, cents. 1888.	1887.
Main line and branches	0.634	0.670	0.412	0.426
United Railroads of New Jersey	1.220	1.285	1.064	1.103
Philadelphia and Erie Railroad	0.519	0.543	0.320	0.324
All lines east of Pittsburgh and Erie	0.693	0.730	0.482	0.497

	Average earnings per passenger mile. 1888.	1887.	Average cost per passenger mile. 1888.	1887.
Main line and branches	2.214	2.263	1.680	1.728
United Railroads of New Jersey	1.934	1.953	1.370	1.393
Philadelphia and Erie Railroad	2.574	2.605	2.028	2.034
All lines east of Pittsburgh and Erie	2.092	2.125	1.543	1.577

The result upon all lines east of Pittsburgh and Erie was a reduction in the earning per ton per mile of $\frac{37}{100}$ of a mill, a reduction in expenses of $\frac{15}{100}$ of a mill, and a decrease of $\frac{22}{100}$ of a mill per ton per mile in the net profit from freight; a decrease in earnings per passenger per mile of $\frac{33}{100}$ of a mill, a decrease of $\frac{34}{100}$ of a mill in expenses, and and increased profit of $\frac{1}{100}$ of a mill.

The average distance traveled by each passenger in 1888 over the main line and branches was $18\frac{1}{10}$ miles, and in 1887 was $18\frac{8}{10}$ miles, a decrease of $\frac{7}{10}$ of a mile.

The great apparent diminution in cost per passenger-mile is probably due to the fact that increased volume of freight caused many items of fixed charges to be distributed between the two lines of business in a different proportion in 1888 from that used in 1887.

Local freight increased much faster than through freight, forming 88.13 per cent. of the whole in 1888, against 87.45 per cent. in 1887, and 86.04 per cent. in 1882.

The length of line operated by the Eastern divisions increased from 2,346 miles in 1887 to 2,369 miles in 1888.

Among the new undertakings contemplated during the present year, are: the construction of a bridge over the Ohio River immediately west of Pittsburgh, for the purpose of further avoiding the very expensive and dangerous transfer of the constantly increasing volume of traffic through the cities of Pittsburgh and Alleghany, the cost of which will probably amount in the aggregate to $1,500,000; the providing of necessary yards and transfer facilities at a point about fourteen miles east of Pittsburgh, where the traffic to and from your Western lines will naturally be transferred from and to the main line, the land for which was purchased many years since, and its improvements commenced during the past year; change of grade through some of the important cities to avoid the dangers of street crossings; and the erection of locomotive shops at Altoona, to be devoted exclusively to the building of new engines, the time having arrived when the present shop facilities at that point are inadequate to properly care for the motive power and supply the additional locomotives required by the increasing traffic, the outlay for which will probably be $1,000,000.

"There was contributed to the Employés' Relief Fund by your company and affiliated lines during the year, $55,901 for operating expenses, and in addition thereto the sum of $8,137 for extra benefits to members of the fund whose disability had continued over fifty-two weeks, and who were, therefore, no longer entitled to regular benefits from the fund. The amount contributed by your employés was $341,620, and the receipts from interest were $8,739, which, with the contributions by the companies, as stated above, $64,039, made a total of $414,398. This added to the balance on hand at the beginning of the year, $192,157, aggregated $606,556. Out of this fund there was paid to the families of employés in death benefits, and for sickness and accidents, the sum of $283,512, and for expenses, $55,901, leaving a balance of $267,142. After deducting therefrom the amount of outstanding unadjusted claims, and setting aside a proper reserve fund to meet liabilities growing out of the increasing age of the members, there remained a net surplus of $170,532. The number of persons receiving death benefits was 250, making an average for each case of $523. There were 19,332 members of the fund at the close of the year.

"The Employés' Saving Fund, referred to in the last annual report, is now in successful operation, and during the year, 1,807 of your employés availed themselves of the opportunity to become depositors therein. The amount of deposits received during the year was $421,191, and the balance remaining at the close of the year was $364,390. Of this amount $300,000 have been invested in the four per cent. bonds of the Philadelphia & Erie.

"The rates received for freight traffic show a continued annual decrease, even more marked in 1888 than in previous years; the partial failure of the crops in the West having affected the volume of through traffic, and stimulated an active competition among the Western roads for that business at unremunerative rates. This disastrous competition finally extended to the Eastern trunk lines, and found expression in an open and severe reduction in the west-bound tariff by one of the principal railway companies, to meet what it believed to be the secret rates of some of its competitors. Your management, not unmindful of the advantages that have accrued to your properties from the conservative policy uniformly adopted by it, endeavored to maintain rates at a just and remunerative standard; but were reluctantly compelled to meet the tariffs made by other responsible lines, in order to protect the commercial and manufactuuring industries situated upon your roads, and prevent a severe depletion of the volume of your traffic.

"The continuance of this unfortunate condition of affairs induced a widespread feeling of uneasiness, not only in financial but in general business circles; and has called forth a renewed endeavor on the part of those entrusted with the management of railways to arrive at some method, in harmony with the Inter-state Commerce law, that will regulate such competition. That law having now been in operation for nearly two years, an opportunity has been afforded to judge, in some measure, of its effect upon the interests of the public and the railways. While in many respects it has been beneficial, yet is has tended to complicate and render more difficult the management of the transportation interests of the country, since it has undertaken to regulate and prescribe the manner in which the public should be served by the transportation companies, but has failed to provide any method which would insure the maintenance of just and uniform rates, and properly protect the railway in erests."

The Georgia, Southern & Florida, a new road from Macon, Ga, southward to Palatka, Fla. (now completed to Valdosta, Ga.), makes its employés an offer of yearly premiums, as follows:

To the best engineer in the efficient discharge of all his duties, $100; to the best conductor in the faithful discharge of all his duties, $100; to the best fireman, for the care of engine, etc., $50; to the baggage master who makes fewest errors in handling baggage, $50; to the flagman who best protects the rear of his train, $50; to the section master who keeps the best section of track, $100; to the wife of the section master who keeps best care of premises about the section master's house, $50; to the agent who keeps the prettiest flower garden, $100; to the agent most efficient in the discharge of all his duties, $50; to the section hand who has the best time, most regular and prompt, $25; to the train porter who keeps the best care of his train, $25.

This is a novel scheme, and it will be interesting to see how it works. On a road with a comparatively small number of men a prize should be a considerable incentive to intelligent effort, though it is true that among a large force the conditions of competition are so affected by the inevitable presence of a few specially proficient individuals that the only proper method is a system of rewards whereby all who attain a certain degree of excellence shall secure *some* recognition. Some of the features of this plan are somewhat peculiar, and it is to be presumed that they are worked out more in detail than appears from the circular. An engineer who is an excellent runner, but only medium as a fuel economizer, cannot readily be compared with another who saves coal but wastes time or kills animals. Passenger conductors and freight conductors ought to be in separate classes. We trust the baggage-master who frequently carries letters past their destination will suffer as well as the one who is careless with trunks. The flagman who does *not* best protect the rear of the train will not be known (except when a collision occurs) unless the company enforces better discipline, or there is a higher sense of honor among the men, or more detectives are employed, than on most roads. The section master's wife who lives out of sight of the line—say in the aristocratic residence portion of the city—can cheat her competitors by hiring a landscape gardener. To give twice as much to the agent with a pretty garden as to the good business man is decidedly one-sided; as bad as for a college to favor baseball players above students proficient in Greek. The train porter has the best chance of all. To him that hath shall be given. Being the best porter, he of course takes in the largest sums in perquisites, and so his wealth multiplies by rapid strides. Seriously, though, it is to be hoped that the Georgia Southern & Florida will have a first-class inspection system, and thereby insure the impartial distribution of the sums named in the announcement. Such practical evidences of interest in the men's methods of work and of a desire to recompense them according to merit are not very common, and this plan, even if it have all the defects we have suggested, will be better than no plan.

The Montezuma Special is to extend its trips, the Richmond & Danville having announced that, beginning with March 12, this train will make fortnightly trips between Washington, D. C., and the City of Mexico. It will start on Tuesdays, and returning will leave the City of Mexico on the alternate Tuesdays, up to and including April 30. The route is by way of Atlanta, the Western of Alabama and the Louisville & Nashville. The train is to start from Washington at 5:30 p. m., and reach New Orleans at 9:30 on Thursday morning. The distance from Washington to New Orleans is 1,144 miles, which, added to the distance from the latter to the City of Mexico, 1,835 miles, makes 2,979 miles, the longest trip on record for anything like a regular train. The Jarrett & Palmer special, from Jersey City to Oakland, Cal., in 1876, was not a regular train and, in fact, it is perhaps unfair to regard the present scheme as much more than an excursion, but the run will be a remarkable one nevertheless. The line of the Santa Fe Route, from Chicago to San Diego, Cal., 2,312 miles, of the Southern Pacific between New Orleans and San Francisco, 2,495 miles, and of the Canadian Pacific between Montreal and Vancouver, 2,906 miles, are covered only by special cars, not whole trains, and these runs are considerably slower than that to Mexico, consuming respectively 112, 107 and 140 hours approximately. The time of the Montezuma Special from Washington to New Orleans is to be 40 hours, apparent time, which is about 3½ hours quicker than the daily express train. The time beyond New Orleans is apparently to be unchanged, making the through time about 113 hours.

A close examination of the locomotive and car equipment of Southern railroads shows a marked advance in the last few years, both in capacity of rolling stock and in perfection of mechanical detail. There is a growing tendency in the South, as well as in the North, to seek for better designs, and, when found, to adhere closely to them as standards. If one road has a good device its neighbors soon avail themselves of it, thus showing a mutual good fellowship and friendly feeling, which is of great assistance to the continued development of connecting lines of railroads. There are many instances of this co-operation to be found, and our attention has been called to this subject recently by a notable uniformity in locomotives. As an instance, we may mention that the type of consolidation freight locomotive designed for the Norfolk & Western has been adopted on several neighboring lines, this action being a natural result of the appreciation of uniformity as an essential element of progress in a growing country. These locomotives were designed by Mr. Charles Blackwell, when he was Superintendent of Motive Power of the Norfolk & Western, and their success is a compliment to his ability.

Vice-Chairman George H. Daniels, of the Central Traffic Association, in a forcible address before a committee of the Ohio Legislature, Feb. 20, stated that his association had, in the year ending Sept. 30 last, granted 448 applications for reduced fares. The Trunk Line Association had in the same time granted 397 applications; these were in addition to the very large number of excursions and other reductions made locally by the individual lines. These reductions, together with those effected by the use of excursion tickets to health and pleasure resorts, to which the roads in the associations named sell tickets covering 560 different places, bring down the average rate of fare on all the railroads in Ohio to 2.17 cents per mile. The proposition before the Legislature to reduce local fares from 3 cents to 2 cents would in effect prevent all these special concessions to associations, conventions and similar bodies. By the present plan the roads are enabled to earn a fair revenue on passenger traffic, while yet affording low rates in all cases where they are especially desirable in the interest of education, reform, business intercourse, etc. Mr. Daniels stated that the reduction of train service in Iowa would probably amount by March 1 to 150,000 miles per month.

The annual report of Second Assistant Postmaster-General Hon. A. Leo Knott, just received, gives the total length of railroad mail routes at the end of the last fiscal year at 143,713, an increase of 12,764 (9.74 per cent.) over the previous year. The payment to the railroads, including ordinary transportation and railway post-office cars, was $19,524,559, an increase over the previous year of $1,468,467. The fast mail service has been materially increased. That between Chicago and Omaha has been made daily, and now runs both ways; that between New York and Chicago now runs east as well as west; a fast mail train has been established between Portland, Or., and Chicago; and between Chicago and New Orleans, via Cincinnati, Chattanooga and Meridian. The recommendation that a change should be made in the basis of payment to railroads for mail transportation which was presented in the report for 1886, and again last year, is reiterated. The only proper and just basis is the amount of space occupied, and not the weight of the mails.

It is known that the Pennsylvania is building new locomotive shops of considerable capacity at Altoona. Naturally, it is expected that these shops will be models of adaptation to the work to be done. One example of the thoroughness with which they will be planned and equipped has just come to our knowledge. A committee is organized, including the Mechanical Engineer of the road and the Master Mechanics from various divisions, to examine into and report on the equipment of the works. This committee has visited various locomotive shops and the works of makers of machine tools, with the purpose of ascertaining what are the best and most recent designs in all details. These shops are to be devoted entirely to building new locomotives, and the present divisional shops will be confined to repairs. By this arrangement the engines of the entire system will be made to standards in every detail.

For a clumsy contrivance the bell-cord holds its place with great tenacity, but it is slowly giving way to better forms of train signals. The Erie and the New York & New England

are equipping their passenger train cars with the Westinghouse air signal. The New York Central & Hudson River is also trying it on one train. The Old Colony is trying an air signal devised by an employé of the road. Several electric train signals of considerable merit are in more or less use. The advantages of an efficient atmospheric or electric signal over the almost universal bell-cord are so obvious that it is strange that they are not more generally used. The air signal particularly can not be regarded as an experiment. It has long been used for the entire passenger equipment of two or three great lines, and its thorough efficiency is demonstrated beyond any question; while the disadvantages of the bell-cord are as serious as ever and possibly growing worse. Occasional reports of unsuccessful attempts to stop trains are apparently as frequent as they were years ago.

The railroad law column this week contains several decisions that are interesting reading. One case tells how the Oregon Railroad Commissioners tried to enforce a view which any office boy could have told them would not stand under the law. A Texas case seems to indicate that the cherished privilege of walking on the track and getting killed is not denied the dear public down there with the stern rigor that characterizes the statutes of Eastern states. The lesson that swapping checks with passengers is delicate business for baggage masters to indulge in has had to be learned over again in Minnesota. Locomotive runners who find it hard to keep a strict lookout when passing a station where a Governor is being serenaded or a fire company is making excitement can see how the laxity was the means of a road being mulcted in Colorado; and conductors can take warning from the Wisconsin case, where a train was backed over a street crossing without giving proper warning. A vigilant lookout is important, whether the train is moving forward or backward. The conductor is responsible in one case as fully as the engineer is in the other, though his instructions do not generally state the fact as explicitly as it is laid down for the engineer. Runners who do not make it a rule to always face ahead unless there is a good reason for turning their eyes elsewhere, will do well to look into their own habits a little. They will find that it is often very easy when the surrounding scenery is attractive or there is an interesting herd of cattle in an adjoining pasture to run a half mile without knowing whether the line ahead is covered with frogs or butterflies. The runner of a passenger train was seen the other day to pass a block signal, —which, fortunately, was at safety—without giving it any more attention than he would a ghost in the day time. He evidently was considering the adjacent field with a view of buying it.

The controversy in Oregon over the Railroad Commission and its powers has resulted in the passage of a bill creating a new commission. The new bill, which was vetoed by Governor Pennoyer, but passed over his veto, provides for the election of three commissioners by the legislature, not more than two of them to be of one political party. The Legislature elected as members of the new commission the following: J. P. Faul, of Baker; George W. Colvig, of Douglas; Robert Clow, of Polk.

The Chicago & Alton announces that beginning next Sunday the fast train service on that road between Chicago and Kansas City will be restored. It is stated that the Burlington will take the same action at the same time, and the Rock Island a week later. The Wabash has protested against this change, and declares that it will regard the agreement to maintain fares as abrogated as soon as the new time-table goes into effect.

NEW PUBLICATIONS.

The Station Agent.—This is the title of a new monthly journal published at Cleveland, O., by Wright, Gibson & Mack. It is a handsome paper, printed in clear type, on fine paper. It is devoted to the interests of the class indicated by its title, and presents a very creditable first number. There are original articles on the English Railway Clearing House, the question of ticket commissions and other subjects. Biographical sketches of officers of railroad employés' associations are given, and much other interesting matter. There is a department of law, and illustrations of two handsome new station buildings. The editorial department is marked by good sense and appreciation of the true mission of a paper of this kind.

The Amendments to the Inter-State Commerce Law.

The following is the text of the bill amending the Inter-state Commerce act, which became a law March 3:

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled, That section six of an act entitled "An act to regulate commerce," approved Feb. 4, 1887, be, and it is hereby, amended so to read as follows:

"SEC. 6. That every common carrier subject to the provisions of this act shall print and keep open to public inspection schedules showing the rates and fares and charges for the transportation of passengers and property which any such common carrier has established, and which are in force at the time upon its route. The schedules printed as aforesaid by any such common carrier shall plainly state the places upon its railroad between which property and passengers will be carried, and shall contain the classification of freight in force, and shall also state separately the terminal charges and any rules or regulations which in anywise change, affect, or determine any part or the aggregate of such aforesaid rates and fares and charges. Such schedules shall be plainly printed in large type, and copies for the use of the public shall be posted in two public and conspicuous places, in every depot, station or office of such carrier where passengers or freight, respectively, are received for transportation, in such form that they shall be accessible to the public and can be conveniently inspected.

"Any common carrier subject to the provisions of this act receiving freight in the United States to be carried through a foreign country to any place in the United States shall also in like manner print and keep open to public inspection, at every depot or office where such freight is received for shipment, schedules showing the through rates established and charged by such common carrier to all points in the United States beyond the foreign country to which it accepts freight for shipment, and any freight shipped from the United States through a foreign country into the United States, the through rate on which shall not have been made public as required by this act, shall, before it is admitted into the United States from said foreign country, be subject to customs duties as if said freight were of foreign production, and any law in conflict with this section is hereby repealed.

"No advance shall be made in the rates, fares and charges which have been established and published as aforesaid by any common carrier in compliance with the requirements of this section, except after ten days' public notice, which shall plainly state the changes proposed to be made in the schedule then in force, and the time when the increased rates, fares, or charges will go into effect; and the proposed changes shall be shown by printing new schedules, or shall be plainly indicated upon the schedules in force at the time, and kept open to public inspection. Reductions in such published rates, fares, or charges shall only be made after three days' previous public notice, to be given in the same manner that notice of an advance in rates must be given.

"And when any such common carrier shall have established and published its rates, fares, and charges in compliance with the provisions of this section, it shall be unlawful for such common carrier to charge, demand, collect, or receive from any person or persons a greater or less compensation for the transportation of passengers or property, or for any services in connection therewith, than is specified in such published schedule of rates, fares, and charges as may at the time be in force.

"Every common carrier subject to the provisions of this act shall file with the Commission, hereinafter provided for, copies of its schedules of rates, fares, and charges which have been established and published in compliance with the requirements of this section, and shall promptly notify said Commission of all changes made in the same. Every such common carrier shall also file with said Commission copies of all contracts, agreements, or arrangements with other common carriers in relation to any traffic affected by the provisions of this act to which it may be a party. And in cases where passengers and freight pass over continuous lines or routes operated by more than one common carrier, and the several common carriers operating such lines or routes establish joint tariffs of rates or fares or charges for such continuous lines or routes, copies of such joint tariffs shall also, in like manner, be filed with said Commission. Such joint rates, fares, and charges on such continuous lines so filed as aforesaid shall be made public by such common carriers when directed by said Commission, in so far as may, in the judgment of the Commission be deemed practicable; and said Commission shall from time to time prescribe the measure of publicity which shall be given to such rates, fares, and charges, or to such part of them as it may deem it practicable for such common carriers to publish, and the places in which they shall be published.

"No advance shall be made in joint rates, fares, and charges, shown upon joint tariffs, except after ten days' notice to the Commission, which shall plainly state the changes proposed to be made in the schedule then in force, and the time when the increased rates, fares or charges will go into effect. No reduction shall be made in joint rates, fares and charges, except after three days' notice, to be given to the Commission, as is above provided in the case of an advance of joint rates. The Commission may make public such proposed advances, or such reductions, in such manner as may, in its judgment, be deemed practicable, and may prescribe from time to time the measure of publicity which common carriers shall give to advances or reductions in joint tariffs.

"It shall be unlawful for any common carrier, party to any joint tariff, to charge, demand, collect, or receive from any person or persons a greater or less compensation for the transportation of persons or property, or for any services in connection therewith, between any points as to which a joint rate, fare, or charge is named thereon than is specified in the schedule filed with the Commission in force at the time.

"The Commission may determine and prescribe the form in which the schedules required by this section to be kept open to public inspection shall be prepared and arranged, and may change the form from time to time as shall be found expedient.

"If any such common carrier shall neglect or refuse to file or publish its schedules or tariffs of rates, fares, and charges as provided in this section, or any part of the same, such common carrier shall, in addition to other penalties herein prescribed, be subject to a writ of mandamus, to be issued by any circuit court of the United States in the judicial district wherein the principal office of said common carrier is situated, or wherein such offense may be committed, and if such common carrier be a foreign corporation in the judicial circuit wherein such common carrier accepts traffic and has an agent to perform such service, to compel compliance with the aforesaid provisions of this section; and such writ shall issue in the name of the people of the United States, at the relation of the Commissioners appointed under the provisions of this act; and the failure to comply with its requirements shall be punishable as and for a contempt; and the said Commissioners, as complainants, may also apply, in any such circuit courtof the United States, for a writ of injunction against such common carrier, to restrain such common carrier from receiving or transporting property among the several States and Territories of the United States, or between the United States and adjacent foreign countries, or between ports of transshipment and of entry and the several States and Territories of the United States, as mentioned in the first section of this act, until such common carrier shall have complied with the aforesaid provisions of this section of this act."

SEC. 2. That section 10 of said act is hereby amended so as to read as follows:

"SEC. 10. That any common carrier subject to the provisions of this act, or whenever such common carrier is a corporation, any director or officer thereof, or any receiver, trustee, lessee, agent or person, acting for or employed by such corporation, who, alone or with any other corporation, company, person, or party, shall willfully do or cause to be done, or shall willingly suffer or permit to be done, any act, matter, or thing in this act prohibited or declared to be unlawful, or who shall aid or abet therein, or shall willfully omit or fail to do any act, matter, or thing in this act required to be done, or shall cause or willingly suffer or permit any act, matter, or thing so directed or required by this act to be done not to be so done, or shall aid or abet any such omission or failure, or shall be guilty of any infraction of this act, or shall aid or abet therein, shall be deemed guilty of a misdemeanor, and shall, upon conviction thereof in any district court of the United States within the jurisdiction of which such offense was committed, be subject to a fine of not to exceed five thousand dollars for each offense: Provided, That if the offense for which any person shall be convicted as aforesaid shall be an unlawful discrimination in rates, fares or charges for the transportation of passengers or property, such person shall, in addition to the fine hereinbefore provided for, be liable to imprisonment in the penitentiary for a term of not exceeding two years, or both such fine and imprisonment, in the discretion of the court.

"Any common carrier subject to the provisions of this act, or, whenever such common carrier is a corporation, any officer or agent thereof, or any person acting for or employed by such corporation, who, by means of false billing, false classification, false weighing, or false report of weight, or by any other device or means, shall knowingly and willfully assist, or shall willingly suffer or permit, any person or persons to obtain transportation for property at less than the regular rates then established and in force on the line of transportation of such common carrier, shall be deemed guilty of a misdemeanor, and shall, upon conviction thereof in any court of the United States of competent jurisdiction within the district in which such offense was committed, be subject to a fine of not exceeding five thousand dollars, or imprisonment in the penitentiary for a term of not exceeding two years, or both, in the discretion of the court, for each offense.

"Any person and any officer or agent of any corporation or company who shall deliver property for transportation to any common carrier, subject to the provisions of this act, or for whom as consignor or consignee any such carrier shall transport property, who shall knowingly and willfully, by false billing, false classification, false weighing, false representation of the contents of the package, or false report of weight, or by any other device or means, whether with or without the consent or connivance of the carrier, its agent or agents, obtain transportation for such property at less than the regular rates then established and in force on the line of transportation, shall be deemed guilty of fraud, which is hereby declared to be a misdemeanor, and shall, upon conviction thereof in any court of the United States of competent jurisdiction within the district in which such offense was committed, be subject for each offense to a fine of not exceeding five thousand dollars or imprisonment in the penitentiary for a term of not exceeding two years, or both, in the discretion of the court.

"If any such person, or any officer or agent of any such corporation or company, shall, by payment of money or other thing of value, solicitation, or otherwise, induce any common carrier subject to the provisions of this act, or any of its officers or agents, to discriminate unjustly in his, its, or their favor as against any other consignor or consignee in the transportation of property, or shall aid or abet any common carrier in any such unjust discrimination, such person, or such officer or agent of such corporation or company, shall be deemed guilty of a misdemeanor, and shall, upon conviction thereof in any court of the United States of competent jurisdiction within the district in which such offense was committed, be subject to a fine of not exceeding five thousand dollars, or imprisonment in the penitentiary for a term of not exceeding two years, or both, in the discretion of the court, and such person, corporation or company shall also, together with said common carrier, be liable, jointly or severally, in an action on the case to be brought by any consignor or consignee discriminated against in any court of the United States of competent jurisdiction for all damages caused by or resulting therefrom."

SEC. 3. That section twelve of said act is hereby amended so as to read as follows:

"SEC. 12. That the Commission hereby created shall have authority to inquire into the management of the business of all common carriers subject to the provisions of this act, and shall keep itself informed as to the manner and method in which the same is conducted, and shall have the right to obtain from such common carriers full and complete information necessary to enable the Commission to perform the duties and carry out the objects for which it was created, and for the purposes of this act the Commission shall have power to require, by subpœna, the attendance and testimony of witnesses and the production of all books, papers, tariffs, contracts, agreements, and documents relating to any matter under investigation, and in case of disobedience to a subpœna, the Commission, or any party to a proceeding before the Commission, may invoke the aid of any court of the United States in requiring the attendance and testimony of witnesses and the production of books, papers, and documents under the provisions of this section.

"And any of the circuit courts of the United States within the jurisdiction of which such inquiry is carried on may, in case of contumacy or refusal to obey a subpœna issued to any common carrier subject to the provisions of this act, or other person, issue an order requiring such common carrier or other person to appear before said Commission (and produce books and papers if so ordered) and give evidence touching the matter in question; and any failure to obey such order of the court may be punished by such court as a contempt thereof. The claim that any such testimony or evidence may tend to criminate the person giving such evidence shall not excuse such witness from testifying; but such evidence or testimony shall not be used against such person on the trial of any criminal proceeding."

SEC. 4. That section 14 of said act is hereby amended so as to read as follows:

"SEC. 14. That whenever an investigation shall be made by said Commission, it shall be its duty to make a report in writing in respect thereto, which shall include the findings of fact upon which the conclusions of the Commission are based, together with its recommendation as to what reparation, if any, should be made by the common carrier to any party or parties who may be found to have been injured; and such findings so made shall thereafter, in all judicial proceedings, be deemed prima facie evidence as to each and every fact found.

"All reports of investigations made by the Commission shall be entered of record, and a copy thereof shall be furnished to the party who may have complained, and to any common carrier that may have been complained of.

"The Commission may provide for the publication of its reports and decisions in such form and manner as may be best adapted for public information and use, and such authorized publications shall be competent evidence of the reports and decisions of the Commission therein contained, in all courts of the United States, and of the several States, without any further proof or authentication thereof. The Commission may also cause to be printed for early distribution its annual reports."

SEC. 5. That section 16 of said act is hereby amended so as to read as follows:

"SEC. 16. That whenever any common carrier, as defined in and subject to the provisions of this act, shall violate, or refuse or neglect to obey or perform any lawful order or requirement of the Commission created by this act, not founded upon a controversy requiring a trial by jury, as provided by the seventh amendment to the Constitution of the United States, it shall be lawful for the Commission or for any company or person interested in such order or requirement, to apply in a summary way, by petition, to the circuit court of the United States sitting in equity in the judicial district in which the common carrier complained of has its principal office, or in which the violation or disobedi-

ence of such order or requirement shall happen, alleging such violation or disobedience, as the case may be; and the said court shall have power to hear and determine the matter, on such short notice to the common carrier complained of as the court shall deem reasonable; and such notice may be served on such common carrier, his or its officers, agents, or servants in such manner as the court shall direct; and said court shall proceed to hear and determine the matter speedily as a court of equity, and without the formal pleadings and proceedings applicable to ordinary suits in equity, but in such manner as to do justice in the premises; and to this end such court shall have power, if it think fit, to direct and prosecute in such mode and by such persons as it may appoint, all such inquiries as the court may think needful to enable it to form a just judgment in the matter of such petition; and on such hearing the findings of fact in the report of said Commission shall be prima facie evidence of the matters therein stated; and if it be made to appear to such court, on such hearing or on report of any such person or persons, that the lawful order or requirement of said Commission drawn in question has been violated or disobeyed, it shall be lawful for such court to issue a writ of injunction or other proper process, mandatory or otherwise, to restrain such common carrier from further continuing such violation or disobedience of such order or requirement of said commission, and enjoining obedience to the same; and in case of any disobedience of any such writ of injunction or other proper process, mandatory or otherwise, it shall be lawful for such court to issue writs of attachment, or any other process of said court incident or applicable to writs of injunction or other proper process, mandatory or otherwise, against such common carrier, and if a corporation, against one or more of the directors, officers, or agents of the same, or against any owner, lessee, trustee, receiver, or other person failing to obey such writ of injunction, or other proper process, mandatory or otherwise; and said court may, if it shall think fit, make an order directing such common carrier or other person so disobeying such writ of injunction or other proper process, mandatory or otherwise, to pay such sum of money, not exceeding for each carrier or person in default the sum of $500 for every day, after a day to be named in the order, that such carrier or other person shall fail to obey such injunction or other proper process, mandatory or otherwise; and such moneys shall be payable as the court shall direct, either to the party complaining or into court, to abide the ultimate decision of the court, or into the treasury; and payment thereof may, without prejudice to any other mode of recovering the same, be enforced by attachment or order in the nature of a writ of execution, in like manner as if the same had been recovered by a final decree in personam in such court. When the subject in dispute shall be of the value of two thousand dollars or more, either party to such proceeding before said court may appeal to the Supreme Court of the United States, under the same regulations now provided by law in respect of security for such appeal; but such appeal shall not operate to stay or supersede the order of the court or the execution of any writ or process thereon; and such court may, in every such matter, order the payment of such costs and counsel fees as shall be deemed reasonable. Whenever any such petition shall be filed or presented by the Commission it shall be the duty of the district attorney, under the direction of the Attorney-General of the United States, to prosecute the same; and the costs and expenses of such prosecution shall be paid out of the appropriation for the expenses of the courts of the United States.

"If the matters involved in any such order or requirement of said Commission are founded upon a controversy requiring a trial by jury, as provided by the seventh amendment to the Constitution of the United States, and any such common carrier shall violate or refuse or neglect to obey or perform the same, after notice given by said Commission as provided in the fifteenth section of this act, it shall be lawful for any company or person interested in such order or requirement to apply in a summary way by petition to the circuit court of the United States sitting as a court of law in the judicial district in which the carrier complained of has its principal office, or in which the violation or disobedience of such order or requirement shall happen, alleging such violation or disobedience as the case may be; and said court shall by its order then fix a time and place for the trial of said cause, which shall not be less than twenty, nor more than forty, days from the time said order is made, and it shall be the duty of the marshal of the district in which said proceeding is pending to forthwith serve a copy of said petition, and of said order, upon each of the defendants, and it shall be the duty of the defendants to file their answers to said petition within ten days after the service of the same upon them as aforesaid. At the trial the findings of fact of said Commission as set forth in its report shall be prima facie evidence of the matters therein stated, and if either party shall demand a jury or shall omit to waive a jury the court shall, by its order, direct the marshal forthwith to summon a jury to try the cause; but if all the parties shall waive a jury in writing, then the court shall try the issues in said cause and render its judgment thereon. If the subject in dispute shall be of the value of two thousand dollars or more either party may appeal to the Suprome Court of the United States under the same regulations now provided by law in respect to security for such appeal; but such appeal must be taken within twenty days from the day of the rendition of the judgment of said circuit court. If the judgment of the circuit court shall be in favor of the party complaining, he or they shall be entitled to recover a reasonable counsel or attorney's fee, to be fixed by the court, which shall be collected as part of the costs in the case. For the purposes of this act, excepting its penal provisions, the circuit courts of the United States shall be deemed to be always in session."

SEC. 6. That section 17 of said act is hereby amended so as to read as follows:

"SEC. 17. That the Commission may conduct its proceedings in such manner as will best conduce to the proper dispatch of business and to the ends of justice. A majority of the Commission shall constitute a quorum for the transaction of business, but no Commissioner shall participate in any hearing or proceeding in which he has any pecuniary interest. Said Commission may, from time to time, make or amend such general rules or orders as may be requisite for the order and regulation of proceedings before it, including forms of notices and the service thereof, which shall conform, as nearly as may be, to those in use in the courts of the United States. Any party may appear before said Commission and be heard, in person or by attorney. Every vote and official act of the Commission shall be entered of record, and its proceedings shall be public upon the request of either party interested. Said Commission shall have an official seal, which shall be judicially noticed. Either of the members of the Commission may administer oaths and affirmations and sign subpœnas."

SEC. 7. That section 18 of said act is hereby amended so as to read as follows:

"SEC. 18. That each Commissioner shall receive an annual salary of seven thousand five hundred dollars, payable in the same manner as the judges of the courts of the United States. The Commission shall appoint a secretary, who shall receive an annual salary of three thousand five hundred dollars, payable in like manner. The Commission shall have authority to employ and fix the compensation of such other employés as it may find necessary to the proper performance of its duties. Until otherwise provided by law, the Commission may hire suitable offices for its use, and shall have authority to procure all necessary office supplies. Witnesses summoned before the Commission shall be paid the same fees and mileage that are paid witnesses in the courts of the United States.

"All of the expenses of the Commission, including all necessary expenses for transportation incurred by the Commissioners, or by their employés under their orders, in making any investigation, or upon official business in any other places than in the city of Washington, shall be allowed and paid on the presentation of itemized vouchers therefor approved by the chairman of the Commission."

SEC. 8. That section 21 of said act is hereby amended so as to read as follows:

"SEC. 21. That the Commission shall, on or before the first day of December in each year, make a report, which shall be transmitted to Congress, and copies of which shall be distributed as are the other reports transmitted to Congress. This report shall contain such information and data collected by the Commission as may be considered of value in the determination of questions connected with the regulation of commerce, together with such recommendations as to additional legislation relating thereto as the Commission may deem necessary; and the names and compensation of the persons employed by said Commission."

SEC. 9. That section 22 of said act is hereby amended so as to read as follows:

"SEC. 22. That nothing in this act shall prevent the carriage, storage, or handling of property free or at reduced rates for the United States, State, or municipal governments, or for charitable purposes, or to or from fairs and expositions for exhibition thereat, or the free carriage of destitute and homeless persons transported by charitable societies, and the necessary agents employed in such transportation, or the issuance of mileage, excursion or commutation passenger tickets; nothing in this act shall be construed to prohibit any common carrier from giving reduced rates to ministers of religion or to municipal governments for the transportation of indigent persons, or to inmates of the National Homes or State Homes for Disabled Volunteer Soldiers, or inmates of Soldiers and Sailors' Orphan Homes, under arrangements with the boards of managers of said homes; nothing in this act shall be construed to prevent railroads from giving free carriage to their own officers and employés, or to prevent the principal officers of any railroad company or companies from exchanging passes or tickets with other railroad companies for their officers and employés, and nothing in this act contained shall in any way abridge or alter the remedies now existing at common law or by statute, but the provisions of this act are in addition to such remedies: Provided, That no pending litigation shall in any way be affected by this act."

SEC. 10. That the circuit and district courts of the United States shall have jurisdiction upon the relation of any person or persons, firm, or corporation alleging such violation by a common carrier, of any of the provisions of the act to which this is a supplement and all acts amendatory thereof, as prevents the relator from having inter-state traffic moved by said common carrier at the same rates as are charged, or upon terms or conditions as favorable as those given by said common carrier for like traffic under similar conditions to any other shipper to issue a writ or writs of mandamus against said common carrier, commanding such common carrier to move and transport the traffic, or to furnish cars or other facilities for transportation for the party applying for the writ, provided that if any question of fact as to the proper compensation to the common carrier for the service to be enforced by the writ is raised by the pleadings, the writ of peremptory mandamus may issue, notwithstanding such question of fact is undetermined, upon such terms as to security, payment of money into the court, or otherwise, as the court may think proper, pending the determination of the question of fact: Provided, That the remedy hereby given by writ of mandamus shall be cumulative, and shall not be held to exclude or interfere with other remedies provided by this act or the act to which it is a supplement.

SEC. 12. That the Commission is hereby authorized, empowered and required to execute and enforce the provisions of this act, and upon the request of said Commission the District Attorney of the United States shall institute and prosecute all necessary proceedings in the proper court under the direction of the Attorney General for the enforcement of this act and for the punishment of all violations thereof.

TECHNICAL.

Locomotive Building.

The New York & New England has recently received three freight locomotives, and has seven others under contract for early delivery.

Car Notes.

The Seaboard & Roanoke has just completed 100 box cars at its own shops, equipped with the Janney coupler and automatic brakes. The Janney coupler will hereafter be used on all cars built for this road. The new shops at Portsmouth, Va., have also just been completed.

The Barney & Smith Manufacturing Co., Dayton, O., has recently been awarded a contract for building twenty emigrant sleeping cars for the Northern Pacific.

The West Virginia Central & Pittsburgh has under contract fifty freight and three passenger cars, and also two locomotives.

Osgood Bradley & Sons, of Worcester, Mass., are building several new cars for the Knox & Lincoln road.

The Middletown Car Works, of Middletown, Pa., have commenced the construction of 350 freight cars for the Philadelphia & Reading. The Dauphin Car Works are also constructing 150 freight cars for the same road.

The Central of New Jersey has under contract with the Harrisburg Car Manufacturing Co., 150 box cars, and with Pardee, Snyder & Co., Watsontown, Pa., 100 box cars.

The following cars were shipped from the Pullman car shops during the past week: 119 stock cars for the Atlantic & Pacific, 10 box cars for the Cleveland, Columbus, Cincinnati & Indianapolis, 26 passenger cars and 4 baggage cars for the Baltimore & Ohio. Orders have been received for 25 new passenger cars.

Bridge Notes.

The Old Colony has had plans prepared for the six short bridges which will be necessary on the new line to North Attleboro, Mass.

The King Iron Bridge Co., Cleveland, O., has been awarded the contract for building the iron bridge at Elkton, Md.

The Phœnix Bridge Co. has the contract for building the two large iron bridges over the Cape Fear and Black rivers for the Cape Fear & Yadkin Valley road. The company also has the contract for building the new steel bridge for the Atlantic & Pacific across the Colorado River at Red Rock, Ariz. This bridge will be a cantilever 990 ft. long, with 666 ft. between the main piers. It is to be completed by June 1.

Congress has passed bills authorizing the construction of bridges by the Vicksburg, Shreveport & Pacific Railroad over the Red River at Shreveport, and over the Ouachita River at Monroe, La.; also the construction of a bridge across the Red River by the Natchitoches Railroad, and also across the Arkansas River near Rumming's Landing, and the White River at Aberdeen, Ark.

The Richmond, Fredericksburg & Potomac Railroad will receive bids for constructing a high iron bridge across the rapids of the James River, near Richmond, Va. E. T. D. Myers, Richmond, is General Superintendent.

The Commissioners of Wyandotte County, Kan., will soon receive proposals for the erection of a bridge across the Kansas River at Bonner Springs.

Proposals will be received until March 13 by the Superintendent of Public Work at Albany, N. Y., for constructing a wrought-iron bridge over Chemung Canal at Watkins, N. Y.

Proposals will be received by the County Surveyor, F. J. O'Flaherty, Kansas City, until March 11, for the erection of a wrought-iron bridge and a wrought-iron bridge and trestle.

The Smith Bridge Co., of Toledo, O., has just completed an iron bridge over the Passaic River at Avondale, N. J. The bridge is 360 ft. long, with a draw span of 165 ft., and two fixed spans of 90 ft.

Manufacturing and Business.

The contract for the building of the new station to be erected on Spruce and Church streets, Hartford, by the Hartford & Connecticut Western, has been let to H. W. Fox & Co., of Hartford.

Pedrick & Ayer, 1,025 Hamilton street, Philadelphia, report sales of their heavy milling machine with all attachments; one to the Lehigh Valley; one to the Kansas City, Fort Scott & Gulf, and one to the Trenton Iron Co., making a total of 20 machines sold in the past 14 months.

Keuffel & Esser, 127 Fulton street, New York City, the celebrated makers of engineering instruments, announce that they have transferred their business to the Keuffel & Esser Co., by whom it will be hereafter conducted, but the control and management of the business will be the same as heretofore. "The change has been made to secure for our business the advantages of permanency and freedom from complications and interruptions incident to the uncertainty of life."

The Lehigh Valley is erecting at South Plainfield Junction 12 of the parabolic semaphore signals invented by C. Herschel Koyl, of Swarthmore, Pa. Of these, eight are of the larger kind and four of the smaller. The Philadelphia & Reading is erecting two of the signals as an experiment, and the West Shore will also try one. A company is being formed to manufacture the signal, and it is expected that it will be ready to receive orders by April 1.

J. A. Fay & Co., Cincinnati, O., are sending 25 different kinds of wood-working tools to the Paris Exposition, which opens next May. The firm is very busy completing orders for tools for railroad shops, and recently shipped 10 carloads of wood-working machinery to the Anniston works of the United States Rolling Stock Co., and another large order to the car works at Decatur, Ala.

The American Refrigerator Transit Co. has been incorporated at Louisville, Ky., by Reid Northrop and others. The capital stock is $500,000, and the company is to manufacture and operate cars for the transportation of perishable freights.

Articles incorporating the Arnold Patent Car Brake & Starter Co. have been filed at Columbus, Ind., with a capital stock of $100,000. The company is now arranging to build there.

The Ross-Meehan Steel Brake Shoe Co., of Chattanooga, has elected the following officers: J. T. Cahill, President and Treasurer; Charles Herron, Cincinnati, Vice-President; Frederick Dandy, Chicago, Secretary.

Anderson, Du Puy & Co., of Pittsburgh, Pa., are at present completing an order for 300 tons of spiral springs for the 2,000 cars which the Pennsylvania road is building. The firm is considering the desirability of building a separate shop for making elliptic springs for locomotives and passenger cars, and expects in the near future to have this department in good running order. The firm is also increasing its tool steel department, the present furnaces being taxed to their utmost capacity.

We are asked to say that the Hussey Re-heater & Steam Plant Improvement Co. wishes it understood that although it is doing a general engineering, steam fitting and consulting business, it is not intended to interfere with the steam fitters or consulting engineers throughout the country. On the contrary, the company desires their co-operation. As a rule, where it figures on work outside of New York City, it uses the local engineers. This company owns the well-known Hussey re-heater, and controls several other specialties. Among them is a compound automatic feed-water heater, which also utilizes the waste gases in a boiler flue leading to a chimney. Another article is a back pressure valve. The company expects soon to have an upright duplex pump ready for the market. Among contracts on hand at present is one for furnishing the entire steam plant for the new 15 story office building located at 50 Broadway, New York, and known as the Tower Building. This company is also remodeling the steam plant of the Waring Hat Co., Yonkers, N. Y., and guarantees to save over 40 per cent. of the fuel previously consumed. James Marshall, the hatter of Fall River, Mass., is also putting in this system; as is also the Sewall & Day Cordage Co., of Boston, in its new works at Brighton, Mass., and the Nashua Card & Glazed Paper Co., in a new mill at Nashua, N. H.

The Phœnix Machine Co., of Cleveland, O., manufacturers of steam cranes, have several large contracts on hand. They are building 18 cranes for the Anniston Pipe Co., at Anniston, Ala.; three large cranes for a Milwaukee company; one for Charleston, S. C.; a large crane for a Chattanooga and one for a Pittsburgh firm. The company has enough orders to keep them running for 12 months.

Pedrick & Ayer will soon erect a new machine shop in Philadelphia. It will be a two-story brick building, having a frontage of 40 ft. on two streets, and a depth of 160 ft. The first floor will be occupied by the heavy machinery used in manufacturing the large universal milling machines of which the firm makes a specialty. The iron posts of this story will be provided with swinging cranes of heavy construction to facilitate the movement of the heavy pieces in course of manufacture. There is also to be a line of overhead trolleys for the same purpose. On the second floor will be located the general office and draughting and pattern rooms.

Iron and Steel.

The Reading Iron Works, of Reading, Pa., suspended payment March 5. The paid-in capital is $1,050,000, and there is $250,000 first, and $150,000 second mortgage bonds, and $1,000,000 stock. The Reading Iron Works is a recor-

ganization of the firm of Seyburt, McManus & Co. The new company was granted an extension by its creditors about six years ago. The company has seven or eight mills and employs nearly 3,000 hands.

It is expected that the large new plate mill now in course of erection by the Manner Rolling Mill Co., of Toledo, Ohio, will be ready to commence operations in a few weeks.

The works of the Beaver Valley Mfg. Co., at West Bridgewater, Pa., which were destroyed by fire last August, have been rebuilt, and have resumed operations. The company manufactures Bessemer steel castings by a new process, by which the metal is melted in a Swedish furnace, said to be the only one of the kind in the United States.

The Solid Steel Co., of Alliance, O., is fitting up separate works for turning out steel castings by the Mitis process. The building is completed and fully fitted for operation. It has not yet been decided to use the process permanently.

The Michigan Steel Co. proposes to erect in Detroit a plant to make steel according to the process of J. W. Bookwalter, of Springfield, O.

The directors of the Pennsylvania Steel Co. have elected the following officers: President, Luther S. Bent; Vice-President and Treasurer, Eben Barker; Secretary, Edmund N. Smith; General Manager, F. W. Wood; Superintendent, E.C. Felton; Assistant Superintendent, H. H. Campbell.

The Rail Market.

Steel Rails.—Though there have been many inquiries in the market the actual business in the East for the week has amounted to but a few small lots. Quotations are $27@$27.50.

Old Rails.—Quotations are nominally $23@$23.50 for tees.

Iron Brake Beams—Information Wanted.

The Master Car-Builders' Committee on Standard Brake Gear for Air Brake Cars and Standard Brake Shoe for Iron Beams, Messrs. E. B. Wall, G. W. Rhodes and George Hackney, propose to make tests of the different forms of iron beams on the market. Manufacturers of beams have been requested to forward beams for test, but the Committee understands that there is under way much private investigation into the subject of iron beams by various railroad companies and individuals connected with railroad companies. The Committee is anxious to make its report to the association as complete as possible, and would be glad to communicate with any persons having beams which they would like to submit to the association for examination and report.

The Committee has stipulated to the advertised manufacturers that the beams sent for test shall not show a deflection of more than $\frac{1}{10}$ in. under a load of 15,000 lbs.

All parties desiring to communicate with the Committee on the subject of brake beams will please address their communications to Edward B. Wall, Superintendent of Motive Power, Pennsylvania Lines West of Pittsburgh, Southwest System, Columbus, Ohio.

The Ohio Connecting Bridge.

The contracts for the construction of the Ohio Connecting Railroad bridge across the Ohio River, at Brunot's Island, below Pittsburgh, Pa., have been let to the following: W. E. Howley, the grading, and W. F. Patterson the trestling of Division No. 1. On Division No. 2, Drake, Sutton & Co. have the contract for the sub-structure, and the Keystone Bridge Co. that for the iron work. Drake, Sutton & Co. will build the foundation for Division No. 3, and C. J. Shultz the iron work for that division. W. E. Howley & Co. have the grading for Division No. 4, and W. F. Patterson for trestling. The building of the bridge will be under the supervision of Chief Engineer M. J. Becker, of the Pittsburgh, Cincinnati & St. Louis. A description of the work to be done has already been given. The bridge will be about a mile long and will consist of two deck spans, each 121 ft. long, over the Chartier's turnpike; eleven deck spans, each 171 ft. long, over Brunot's Island; two channel spans, one 416 ft., and the other 425 ft. long; one span over the Pittsburgh & Western road of 137 ft.; two spans over the Pittsburgh, Fort Wayne & Chicago yards 150 ft. in length each, and one iron viaduct 700 ft. long.

The building of the bridge and 2¼ miles of railroad from Nimick Station on the Pittsburgh, Cincinnati & St. Louis, to Woods Run, on the Pittsburgh, Ft. Wayne & Chicago, will give the Pennsylvania a line around Pittsburgh, enabling it to carry through shipments of freight between these lines around the city instead of through it.

The Louisville & Nashville Shops.

The question of moving the shops of the Louisville & Nashville from Bowling Green, Ky., to Memphis Junction, has been for some time under consideration. One reason which inclines the officers of the railroad to take this step is that there will be, as a result, considerable saving in operation. The mileage of the Memphis line trains between Memphis Junction and Bowling Green would be saved, and it is estimated that this would bring an economy of some $15,000 a year. Considerable saving in taxes could also be made. No decision has yet been reached.

Preservation of Ties on Austrian Railroads.

The *Zeitschrift für Eisenbahnen und Dampfschiffahrt* publishes in a recent issue an interesting diagram showing the percentage of ties on Austrian railroads impregnated with antiseptic substances. It appears from this that in 1888 there were in use altogether 22,055,778 ties of various kinds of wood. Of these only 7,683,234, or about 35 per cent., had been subjected to preservative treatment, chloride of zinc having been used for 64.2 per cent. of this number, creosote oil for 18.4 per cent. and sulphate of copper for 17.4. The results obtained have been satisfactory and the experience gained has moreover shown, in nearly all cases, that the lower the resisting power to decay of the wood in its natural state, the more favorable are the effects of antiseptic treatment. This is accounted for by the fact that the softer, and ordinarily more perishable, woods absorb double and even three times the amount of preservative required for hard woods. Thus an impregnated soft pine tie has been found to have a considerably longer life than an oak tie in its natural state, and to be lower in cost also. In this respect the experiment which has been commenced on the Southern Railroad of Austria is of special note. Two million treated beech ties are there in use, and, judging from their behavior during the past few years, promise very good results. This is true also on some of the other lines where large quantities of beech ties have been used during the last four years.

The question of relative costs and durability of the treated and the ordinary ties naturally deserves consideration. In treating oak ties the increased first cost over that of the natural tie is balanced only after a number of years, but the good effects of the treatment are then unmistakable. In any event, the comparatively high money value of oak and its slow growth make its preservation by antiseptic treatment eminently desirable. The portable apparatus which has more recently been brought out for carrying out the processes, aided by increasing competition, has, moreover, had the effect of materially reducing the cost of preserved ties, so that their introduction, even on small roads, does not seem to be entirely out of question.

Iron Ties in India.

The manufacture of the Denham-and-Olphert cast-iron sleepers is being briskly carried on in the East Indian Railway workshops at Jamalpur, the daily out-turn being from 400 to 500 complete sleepers. This gives employment to a large number of natives, and is the means of utilizing a large quantity of Burrakur iron monthly, the use of imported iron being entirely suspended meantime.—*The Indian Engineer.*

The Dodge Storage System.

The Philadelphia & Reading is to introduce important innovations in the methods of handling coal at Port Richmond (Philadelphia) by which fully three-fourths of the space now occupied for that purpose can be made available for other uses This result will be achieved by means of the Dodge storage system, by which the coal instead of being dumped from the cars over a large surface is piled in great heaps.

A tall mast is erected near the spot selected for the mount. A patent tackle suspended from the top of the mast carries a car back and forth from the train where the coal is dumped into the car, and it is then drawn up and emptied on the heap, which gradually rises toward the top of the mast. Two big piles already contain 85,000 tons of coal. Arrangements are being made to accommodate 12 more piles of coal, which will contain 300,000 tons. The masts will be 112 ft. high, and the peak of the pile will reach 100 ft. above the ground, and will cover but one-eighth of the space at present required to store the same quantity. This system includes a "rel ader" which works between a "set" of two heaps and loads back into the cars when required.

The Reading is about to construct a new wharf 700 ft. in length near the Port Richmond elevator, which will take the place of the eight wharves now occupied. This will be further supplemented by the building of two more large wharves, which will supersede all those in use at present. The company will then secure new and improved wharves in place of the old crumbling structures as well as deep water, which it was impossible to obtain before.

It is said that the Dodge system will be introduced at the docks of the Pennsylvania, at South Amboy, N. J. It is proposed to have ten heaps, containing in the aggregate 100,000 tons. An advantage offered by this method is that the coal can be piled up at some distance from the water's edge, thus saving expensive frontage, the heaps at Port Richmond being 700 or 800 ft. from the docks.

Equipment for German Roads.

It is stated that the demand for railroad equipment will be unusually large in Germany this year, and that the Central Board of the Prussian Government Railroads will shortly contract for 7,000 freight vehicles, 400 locomotives and a large number of baggage cars. It is thought that the expenditures necessary to meet the present demands of the railroad traffic will amount to fully 40,000,000 marks ($10,000,000). The traffic on the roads between 1880 and 1887 increased about 120 per cent., while the rolling equipment increased 86 per cent.

The New Buffalo Docks.

The contract for docks and trestles of the Central Dock and Terminal Co. in Buffalo has been awarded to W. F. Wentz, of Moreland, N. Y. The work will cost about $300,000, and is for the handling of coal from the Philadelphia & Reading system. Work will begin soon, and is to be finished in one year.

THE SCRAP HEAP.

Law to Punish Train Robbers.

A law has been passed in the Territory of Arizona making train robbery a capital crime. In publishing this fact the New York *Herald* prints a list of 20 daring and audacious train robberies which have occurred during the past three years, chiefly in the thinly settled regions of the South and West. In very few of the cases is there any record of the capture or punishment of the criminals.

Ties Made of Old Rails.

In the *Organ für die Fortschritte des Eisenbahnwesen* of recent date, we find a number of illustrations and a description of a method of using old rails for cross ties. The rails are cut into lengths ranging from about 7 ft. 3 in. to 8 ft. Two such lengths are employed for each tie, being placed head to head with the webs horizontal, and notched to afford a bearing for a plate upon which the rail rests. The latter is firmly secured by special clamping plates and bolts, which pass down through the webs of the tie rails. This dubious effort at economy will hardly commend itself to American engineers.

Indian Railroads.

The railway reconnoissance which Sir Guilford Molesworth and Colonel Smith are making along the east coast of the Madras Presidency is, in a way, a new departure. Hitherto the one great principle guiding the development of railways in India has been to lay the lines from inland trading centres to sea-port towns, so that the traffic might reach the coast in the quickest possible time. The line now being reconnoitred would run parallel with the sea-board for several hundred miles, and would thus have no feeders whatever, on one side, throughout its whole length. From Madras Town to Diamond Harbor there is not a single port having direct railway communication with the interior, and the nature of the coast is such that no good harbors are available, without which any large development of trade is impossible. We imagine that the chances of the line being constructed are very small indeed.—*The Indian Engineer.*

A New Australian Road.

The Government of Western Australia has agreed to aid a line of railroad to be constructed from Eucla to Perth, a distance of 800 miles, which, when completed, will bring into railroad connection Perth, Adelaide, Melbourne, Sydney and Brisbane. It is expected that the work will occupy 10 years. The contractors have agreed to construct the railroad on the understanding that for every mile completed they shall receive from the government the gift of 20,000 acres of land.

Australian Finance and Railroads.

The "Handbook of New South Wales Statistics" for 1877 states that the estimated population of Australia is 3,546,727, showing an increase of 120,155, or 3.39 per cent. for the year; 54 per cent. of this increase is due to immigration. The small increase from births is explained by the fact that there are only about 84 females to 100 males. The public debt is £160,675,417, or £44 13s. 1d. ($218.13) per capita.

About 100 million sterling of the above debt returns some direct income, having been expended on railroads, waterworks, etc., the 9,398 miles of railroad having cost 95 millions in round numbers or a little over £10,000 per mile. In Victoria the net earnings of the government roads are about 42 per cent. of the gross receipts, giving almost exactly 4 per cent. on the capital, so that there is no loss, as the loans were made at 4 per cent. But in other colonies the working expenses are from 60 to 70 per cent., and in Western Australia the roads are worked at a loss. On an average the return is about 3 per cent on the capital invested, so that 1 per cent. has to be made up from other revenues.

Weight of Anthracite Coal.

Mr. W. D. Zehner, Superintendent of the Lehigh Coal & Navigation Co., has recently made some experiments on the weight of Old Company Lehigh coal, by measuring and weighing the contents of several scows. In this manner he determined the following average weights, in pounds per cubic foot.

Lump	61.88	Nut	60.34
Broken	61.09	Pea	59.88
Egg	61.54	Buckwheat	61.78
Stove	60.67		

The buckwheat coal, it is supposed, was somewhat damp, which accounts for the anomalous weight. All the figures given above are larger than the weights determined by Professor Johnson for softer varieties of Pennsylvania anthracite.—*Engineering and Mining Journal.*

The Present Price of Rare Metals.

For some special industries, materials having qualities not possessed by the ordinary metals (including those usually called "precious") are required. Thus, palladium is used for certain parts of watches, iridium for the points of gold pens, etc. It may interest the reader to know the current price of the rare metals which are occasionally used. The following table gives the values in dollars per pound.

Metal.	Price, per lb.
Vanadium	$10,847
Rubidium (named from the dark red lines of its spectrum)	3,745
Zirconium	6,942
Lithium (the lightest known metal)	6,749
Glucinium	5,206
Calcium	4,339
Strontium	4,196
Yttrium	3,943
Erbium	3,280
Cerium (very heavy)	3,278
Didymium	3,085
Ruthenium (very hard and brittle)	2,314
Rhodium (excessively hard and brittle, fusing only at the highest attainable temperature in a blast furnace)	2,217
Tantalium (or columbium)	2,217
Barium	1,736
Palladium	1,350
Osmium (very brittle)	1,253
Iridium (the heaviest known metal)	1,053

The present value of gold being about $319, and of silver $19 per pound, it will be seen that the so-called "precious" metals have some competitors.

Qualifications of a Passenger Trainman.

A Salt Lake reporter has been trying his hand at the old problem of inventing a novel variety of questions. He lugs in his religious animosities as in the gems which we have quoted from him heretofore:

"Trainmen are expected to answer most any kind of a question. A Melchizedek 'Bus Angel on the Utah Central was bombarded on one train yesterday with a string of questions about the geologic structure of this basin, the size of the membership of the Ogden Baptist Church, the weight of the rails the train was running over, where was a good place in Salt Lake to buy lacteal syrup for nursing mothers, what was the capital stock of the Deseret National Bank, were any of the original Danites on the Salt Lake police force, and then, as the angel was gasping for breath, a venerable widower, whose thoughts might be supposed to be on matters celestial rather than grossly terrestrial, wanted to know who was that pretty blooming girl that got off at Farmington. The angel folded his wings with a howl of despair, and was removed to the baggage car, where he was so long in coming to that the train was at the depot, and Mulloy & Paul had got away with the passengers before he could rush out to save the fragments."

RAILROAD LAW—NOTES OF DECISIONS.

Powers, Liabilities and Regulation of Railroads.

In Kansas the Supreme Court rules that where a railroad company is consolidated with other railroad companies under a new name, it ceases to exist as a corporation; and an action brought by or against such railroad company before its consolidation cannot afterwards be prosecuted by or against it or in its original name.[1]

The Supreme Court of California decides that the state constitution providing that corporations may be formed under general laws, but shall not be created by special act, does not prohibit a duly organized corporation from receiving by assignment from its lawful owners a franchise to lay down and maintain a street railroad.[2]

In Oregon the Supreme Court holds that where the Legislature of the state passed an act creating a board of railroad commissioners, empowering it to examine into the affairs of railroad corporations doing business within the state, and required it to make a biennial report, with such suggestions "as to what changes in the classification of freights, or what change in the rate of freights or fares, are advisable for the public welfare," but conferred no express authority upon the board to regulate the price of freight, or to determine when freight charges were unreasonable, the board had no jurisdiction to require a railroad company to refund to a shipper a sum of money alleged to have been exacted from him in excess of a reasonable charge for the shipment.[3]

The Supreme Court of South Carolina decides that transportation between two points in the same state over connecting railroad lines, one of which lies wholly in another state, is inter-state commerce, and beyond the jurisdiction of the South Carolina Railroad Commission.[4]

In Dakota it is held by the Supreme Court that the Dakota act for the levy and collection of taxes upon railroad property, approved March 9, 1883, is unconstitutional in so far as it attempts to levy a tax upon the earnings of railroad companies derived from inter-state transportation, being to that extent an interference with inter-state commerce. A railroad company which has paid such tax is entitled to have that part of the payment based on the unconstitutional tax applied to valid taxes thereafter accruing.[5]

In Texas, in an action for work done on defendant's railroad, the evidence was that plaintiff had been working for a contractor, and, fearing that he would not be paid, was about to quit work, when defendant's agent induced him to keep on work under promise to pay him. The greater part of the work was then done. The Supreme Court holds that a verdict for an amount nearly equal to plaintiff's whole claim, as well for the work done before as after the promise was made, should be set aside as contrary to the evidence.[6]

A Missouri statute provides that any railroad company organized under the laws of that state, whose track shall at the state line connect with any foreign railroad, may consolidate with such railroad. The Supreme Court rules that this authorizes a consolidation of an existing domestic company with a foreign one, though the former had not then constructed its road.[7]

The Supreme Court of the United States affirms the con-

stitutionality of the Alabama statute requiring railroad employés to be examined by a state board to determine whether or not they are color-blind, imposing the expense of such examination on the company, and rendering their employment without certificates penal, notwithstanding that the act is applied to companies having lines on which the employés run in different states.[8]

In Georgia a railroad charter gave the company the exclusive right to transport persons and property over its road so long as it chose, so long as its charges should not exceed certain rates. The Supreme Court of the United States rules that this was not a contract between the state and the company, that the latter might charge such rates as it choose, within the prescribed limits, but was a provision that if its rates should exceed these limits its exclusive right might be forfeited. The company was, therefore, subject to subsequent legislation regulating tariff charges.[9]

Carriage of Goods and Injuries to Property.

In Texas the Supreme Court holds that a railroad on whose road the loss occurred, when sued for damages, must allege and prove, in order to get the benefit of an exemption from liability in the bill of lading given by a different company and in a different state, that the exemption is allowed by the law of the state where the goods were shipped.[10]

In Minnesota it is laid down by the Supreme Court that the possession of a baggage check by a passenger is *prima facie* evidence that the carrier has received and is in possession of his personal baggage; and where he delivers such check to the agent of a connecting railroad and receives its check in exchange therefor, the presumption is, in the absence of proof to the contrary, that the baggage is received in due course by the latter company, and it is responsible therefor.[11]

In Kansas the Supreme Court holds that where goods are shipped over a railroad, and are permitted by the owner to remain at the depot of their destination until the railroad company becomes liable therefor only as warehouseman, and afterwards such goods are demanded by the owner, and he is informed by the agent in charge of such depot that the goods have not yet arrived, and afterwards said depot, together with the goods, is burned up, the failure to deliver the goods on the demand of the owner is such negligence as will render the company liable for the value of the goods. Where, on the shipment of goods, a receipt is given to the shipper therefor, on the back of which is printed a contract limiting the liability of the carrier in the transportation of the goods, and the liability as common carrier on the safe arrival of the goods at their destination, and afterwards said goods are permitted to remain at there destination until such carrier becomes liable only as warehouseman, and afterwards said goods are destroyed by fire, *held*, in an action by the owner to recover their value, the receipt and contract are immaterial.[12]

In Georgia the Supreme Court rules that a railroad which hauls to a city goods consigned to a mill 2¼ miles from town, and delivers them at the mill by means of transportation gratuitously furnished by another company over its road, cannot claim, in defense of an action for damage to the goods in transit, that it is not the last road that received the goods. A contract for the transportation of goods by rail from Boston to Atlanta, limiting the liability of the carrier, when made in Massachusetts, and valid by the laws of that state, is valid in Georgia, though it would not be valid if made in the latter state. When the consignor of goods agrees that they may be loaded and transferred on open cars, the carrier, in the absence of negligence on its part, is not liable for any damage caused to the goods by being so loaded and transported.[13]

In Wisconsin the Supreme Court decides that a railroad company lowering the grade of a street to adjust it to its tracks is liable to the owner of an adjacent lot injured thereby as for land taken for the company's use, though none of the lot itself was actually taken.[14]

In Alabama the Supreme Court rules that the state statutes, which render a railroad company liable for injuries to stock where such injuries result from its failure to comply with the statutory requirements, or other negligence of the company, do not require such negligence to be the sole cause. It is sufficient, also, if the failure of the company to comply with the statutory requirements, such as ringing the bell, or blowing the whistle, reasonably contributes to the injury, there being no question of plaintiff's contributory negligence. But it is error in such case, where the stock was injured at a crossing near a station, to charge that, if the locomotive was running at a very rapid rate of speed at the time the stock was struck, and the injury occurred because of this fact, the defendant would be liable, as the statute does not regulate the speed of trains when passing stations or crossings, except when entering a curve crossed by a public road, where the engineer cannot see at least one-fourth of a mile ahead.[15]

In Colorado a cow was struck at a crossing in a city by an engine running at from 10 to 12 miles an hour, which was much faster than allowed by the city ordinance. The view of the crossing was unobstructed for 250 ft. The speed of the train was not slackened, nor the bell or whistle sounded. Either the engineer or fireman, and perhaps both, were looking out of the window at a public gathering at the time. The Supreme Court holds the railroad liable for the damage.[16]

In Kansas the Supreme Court rules that a railroad company may, under the provision of the statute and under the authority of a city ordinance, construct and operate its railroad in a public street in a legal and proper manner, making such alterations in the surface of the street necessary to the construction and operation of its road, and which do not necessarily impair the usefulness of the street, without being liable to abutting lot owners or others for damages; but such a company cannot, any more than an individual, wrongfully and unnecessarily block up or obstruct a street, without being liable therefor.[17]

In Indiana the Supreme Court holds that where an animal trespassing on a railroad track securely fenced is not seen by the engineer, the company is not necessarily guilty of negligence because the engineer does not attend to gestures made by persons near the track, unless the gestures are such as give fair and full warning that injury will result if the train is not halted.[18]

Injuries to Passengers, Employes and Strangers.

In Tennessee a person coming out of a railroad depot, where he had been on business, was struck by a train running at a high rate of speed on a track between the depot and the passenger platform. The person averred that he could not see the train on account of a standing car, and could not hear it, although he listened. There was evidence that there was much noise in the depot at the time. The Supreme Court of the United States rules that the injured person was not guilty of contributory negligence, which, as a matter of law, will prevent his recovering damages.[19]

In Pennsylvania a brakeman on a freight train on a cold night discovered that a step was missing from one of his cars between him and the caboose, and notified the conductor, who told him that he would drop the car at a point beyond if it contained no perishable freight. Before that point was reached the train stopped, and the brakeman went back to the caboose according to custom to eat his breakfast; but the train starting suddenly he ran over the cars to his post, and forgetting about the step, fell and was injured. On the trial the Court held that he was guilty of contributory negligence, and could not recover. The Supreme Court of the United States reverses this judgment, being of opinion that his conduct did not in law amount to contributory negligence.[20]

The Court of Appeals of Kentucky decides that under the statute of that state, providing that if a person not in the employment of a railroad company is killed by the negligence or carelessness of the proprietors or servants of such company, his representatives may recover damages, recovery may be had for ordinary negligence.[21]

In Texas the plaintiff was passing along a side track of defendant's in an incorporated town, towards the crossing, which he found obstructed by cars standing on the main track. He halted at the edge of the side track, near the end of the ties, and looked in front of him for an engine, remaining there for a minute and a half, when he was struck by the pilot of an engine coming up behind, at the rate of from six to eight miles an hour. No bell was rung or whistle blown. The Supreme Court holds that the railroad is liable in damages.[22]

The Supreme Court of Wisconsin decides that the rule that a person approaching a railroad crossing is bound to look and listen for the approach of a train, is inapplicable to a case where the train has just passed the crossing while deceased was within a few rods of it, and driving upon a trot, and has passed on out of his sight in such manner as to induce the belief that it was to continue on in that direction, and where he has no reason to suppose that it would immediately return. In such case it was the duty of the railroad company to have had some one on the rear car, or in some position where he could have seen that no one was about to cross the track before it was backed down over the crossing, to give the deceased timely warning and to signal the train to stop, if there was danger of a collision.[23]

In Missouri a boy 11 years old was killed by defendant's train while coasting in a street of the city of St. Louis. The Court charged that, if deceased did not possess the discretion of an adult at the time of the accident, the jury should consider the fact in deciding whether or not he was guilty of contributory negligence. The Supreme Court holds that the instruction was misleading, and tended to give the jury the impression that, as plaintiff was only 11 years old, he could not be guilty of contributory negligence at all.[24]

In the same state the same court holds that where one engaged in the construction of a sewer beneath a railroad track, in a tunnel, there being a time specified for the performance of the work when the trains are not running, enters the tunnel while in use for the passage of trains, knowing that it has not yet been turned over to the trackmen, and is injured by defendant's train, he is guilty of negligence, and cannot recover for injuries so received.[25]

In Louisiana the Supreme Court lays down the general rule that to recover damages for injuries received from a railroad company it is necessary for plaintiff to prove that the accident in consequence of which the injuries were received was caused by the negligence of the railroad company, and that the plaintiff was not guilty of any negligence which aided the accident.[26]

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1 K., O. & T. R. Co. v. Smith, 19 Pac. Rep., 636.
2 People v. Stanford, 19 Pac. Rep., 693.
3 Board of R. R. Commr's v. C. R. & N. Co., 19 Pac. Rep., 702.
4 Sternberger v. Cape Fear & Y. V. R. Co., 7 S. E. Rep., 836.
5 N. Pac. R. Co. v. Raymond, 40 N. W. Rep., 538.
6 G., H. & S. A. R. Co. v. Howrin, 9 S. W. Rep., 661.
7 Livingston Co. v. First Nat. Bk., 9 S. C. Rep., 18.
8 N. C. & St. L. R. Co. v. State, 9 S. C. Rep., 28.
9 Ga. R. & B. Co. v. Smith, 9 S. C. Rep., 47.
10 Int. & G. N. R. Co. v. Moody, 9 S. W. Rep., 465.
11 Ahlbeck v. St. P., M. & M. R. Co., 40 N. W. Rep., 364.
12 Union Pac. R. Co. v. Moyer, 19 Pac. Rep., 639.
13 W. & A. R. Co. v. Ex. Cotton Mills, 7 S. E. Rep., 916.
14 Shealy v. C., M. & F. N. Co., 40 N. W. Rep., 145.
15 West. R. Co. v. Sistrunt, 5 South. Rep., 79.
16 Col. Cent. R. Co. v. Caldwell, 19 Pac. Rep., 542.
17 O. O. C. & C. G. R. Co., v. Larson, 19 Pac. Rep., 661.
18 Dennis v. L., N. A. & C. R. Co., 15 West. Rep., 547.
19 Jones vs. E. T. R. Co., 9 S. C., Ref. 118.
20 Kane v. North Cent. R. Co., 9 S. C. Rep., 16.
21 L. & N. R. Co. v. Smith, 9. S. W. Rep., 493.
22 Brown v. Griffen, 9 S. W. Rep., 546.
23 Duame v. C. & N. W. R. Co., 40 N. W. Rep., 374.
24 Edwin v. St. L., I. M. & S. R. Co., 9 S. W. Rep., 577.
25 Loeffler v. Mo. Pac. R. Co., 9 S. W. Rep., 580.
26 Diekman v. M. L. & T. R. & S. Co., 5 South. Rep., 76.

General Railroad News.

MEETINGS AND ANNOUNCEMENTS.

Dividends.

Dividends on the capital stocks of railroad companies have been declared as follows:

Atlanta & Charlotte Air Line, 2½ per cent., payable March 6.

Chicago & Northwestern, quarterly, 1¾ per cent. on the preferred stock, payable March 25.

Cleveland & Pittsburgh, quarterly, 1¾ per cent., payable March 15.

Manhattan, ¼ per cent., payable in scrip, April 1.

Meetings.

Meetings of the stockholders of railroad companies will be held as follows:

Atchison, Topeka & Santa Fe, annual meeting, Topeka, Kan., May 9.

Atlanta & Charlotte Air Line, annual meeting, 48 Wall street, New York, March 13.

Cairo, Vincinnes & Chicago, special meeting, Cairo, Ill., April 25.

Chicago, St. Louis & New Orleans, annual meeting, Memphis, Tenn., March 29.

Chicago, St. Louis & Pittsburgh, annual meeting, Union Depot, Indianapolis, March 20.

Cleveland, Chagrin Falls & Northern, special meeting, Cleveland, O., March 27.

Illinois Central, annual meeting, 78 Michigan avenue, Chicago, Ill., March 13.

Kansas City, St. Louis & Chicago, annual meeting, St. Louis, Mo., March 12.

Kentucky Central, annual meeting, Covington, Ky., March 19.

Louisville, New Albany & Chicago, annual meeting, 31 Nassau street, New York City, March 13.

Mississippi & Tennessee River, annual meeting, Memphis, Tenn., March 29.

Missouri Pacific, annual meeting, St. Louis, Mo., March 12.

New York, Ontario & Western, special meeting, 16 Exchange place, New York, April 3.

St. Louis, Iron Mountain & Southern, annual meeting, St. Louis, Mo., March 12.

Railroad and Technical Conventions.

Meetings and conventions of railroad associations and technical societies will be held as follows:

The *New England Railroad Club* will hold its annual dinner and meeting in Boston, March 13.

The *National Association of General Passenger & Ticket Agents* will hold its thirty fourth annual meeting at the Hotel Brunswick in New York, March 19.

The *Train Dispatchers' Association* will hold its second annual convention in Indianapolis, Ind., June 12. E. J. Peabody, 237 Franklin street, Chicago, is Secretary.

The *American Railway Master Mechanics' Association* will hold its next annual convention at Niagara Falls, beginning Tuesday, June 18, with headquarters at the International Hotel. All who wish to secure rooms should apply to Mr. A. H. Gluck, Manager, International Hotel, Niagara Falls, N. Y.

The *National Association of Railway Surgeons* holds its annual convention in St Louis, Mo., May 2, 1889.

The *New England Railroad Club* meets at its rooms in the Boston & Albany passenger station, Boston, on the second Wednesday of each month.

The *Western Railway Club* holds regular meetings on the third Tuesday in each month at its rooms in the Phenix Building, Jackson street, Chicago, at 2 p. m.

The *New York Railroad Club* meets at its rooms, 113 Liberty street, New York City, at 7:30 p. m., on the third Thursday in each month.

The *Central Railway Club* meets at the Tifft House, Buffalo, the fourth Wednesday of January, March, May, August and October.

The *American Society of Civil Engineers* holds its regular meetings on the first and third Wednesday in each month at the House of the Society, 127 East Twenty-third street New York.

The *Boston Society of Civil Engineers* holds its regular meetings at its rooms in the Boston & Albany station, Boston, at 7:30 p. m. on the third Wednesday in each month.

The *Western Society of Engineers* holds its regular meetings at its hall, No. 67 Washington street, Chicago, at 7:30 p. m., on the first Tuesday in each month.

The *Engineers' Club of St. Louis* holds regular meetings in St. Louis on the first and third Wednesdays in each month.

The *Engineers' Club of Philadelphia* holds regular meetings at the house of the Club, 1,122 Gerard street, Philadelphia.

The *Engineers' Society of Western Pennsylvania* holds regular meetings on the third Tuesday in each month, at 7.30 p. m. at its rooms in the Penn Building, Pittsburgh, Pa.

The *Engineers' Club of Kansas City* meets at Kansas City, Mo., on the first Monday in each month.

The *Civil Engineers' Society of St. Paul* meets at St. Paul, Minn., on the first Monday in each month.

The *Montana Society of Civil Engineers* meets at Helena, Mont., at 7.30 p. m. on the third Saturday in each month.

The *Civil Engineers' Club of Kansas* holds regular meetings on the first Wednesday in each month at Wichita, Kan.

PERSONAL.

—Mr. H. N. Newland, Roadmaster on the Missouri, Kansas & Texas, has resigned that position.

—Mr. W. W. Mayberry, Assistant Superintendent of the Matamoras division of the Mexican National Road has resigned.

—Mr. J. F. Clarke, Assistant Division Engineer of the Lake Shore & Michigan Southern, has tendered his resignation, to take effect April 1.

—Col. Robert S. Bevier, Chief Attorney of the Owensboro & Nashville road, and its originator, and for many years its President, died at Owensboro, Ky.

—Mr. M. W. Devine has been appointed Assistant Engineer of the Atlantic Coast Line, to succeed Mr. E. C. Dunn, resigned to accept service on another road.

—Mr. J. G. Johnston, Assistant Superintendent of the Central Iowa, and P. F. Narey, Master of Bridges and Buildings on the same road, have resigned their positions.

—Mr. George F. Wilson, Master Mechanic of the Minneapolis & St. Louis, has been appointed Assistant General Master Mechanic and Master Car Builder of the Chicago, Kansas & Nebraska.

—Edwin Warren, an engineer on the Fitchburg road, whose skillful prevention of a collision was noted in these columns last week, has been presented by the company with a gold watch. The occurence happened in the night, and Engineer Warren was running at about 30 miles an hour when he first saw the danger.

—The President last week appointed Allen E. Morrison, of Perry, Iowa; George W. Bird, of Madison, Wis.; Orlando B. Stealey, of Louisville, Ky.; Isaac M. Weston, of Grand Rapids, Mich.; John P. Irish, of Oakland, Cal., and Alexander Gunn, of Cleveland, Commissioners to examine a portion of the Southern Pacific in California.

—Mr. Paul P. Rainer, for the last three years Chief Clerk of the Central Traffic Association and also Secretary of the East-Bound Classification Committee, has been appointed Chairman of the Joint Rate Inspection Bureau, with office at Chicago. Before going to Chicago Mr. Rainer held a prominent position in Commissioner Fink's office in New York.

—Mr. Henry Wood, Vice-President of the Little Rock & Fort Smith and Wood and Tie Agent of the Missouri Pacific, has resigned these positions, and will for the present retire from active railroad service. Mr. Wood has held these positions for several years, and was previously General Superintendent of the Utah lines of the Denver & Rio Grande. Mr. Wood has also been President and General Superintendent of several lines in the Pennsylvania system.

—Mr. Theodore N. Ely, General Superintendent of Motive Power, Pennsylvania Railroad, was recently elected a member of the Institution of Civil Engineers, England. American readers do not need to be reminded that it is largely due to Mr. Ely's clear judgment and high mechanical and administrative ability that the mechanical department of the Pennsylvania stands among the very first in the world, and that the Altoona shops have become a famous training school. The Institution is to be congratulated on its new member.

ELECTIONS AND APPOINTMENTS.

Addyston & Ohio River.—The incorporators of this Ohio company are: W. P. Anderson, Matthew Addy, B. S. Cunningham and J. N. King, citizens of Cincinnati, O., and George P. Wilshire of the State of Kentucky. The general office, will be at Addyston, O.

Alabama Midland.—The following are now the officers of this road: O. C. Wiley, President; I. B. Newcombe, Vice-President; J. C. Henderson, Treasurer; W. F. Joseph, Secretary; Arthur Pou, Chief Engineer; C. M. Craig, Principal Assistant Engineer.

American Midland.—The officers are: President, Col. William Thorpe, 42 New street, New York; General Man

ager, C. N. Haskell; General Superintendent, George E. Blaine, of Ottawa, O.

Anniston & Jacksonville.—The officers recently elected by the stockholders of this line are James Cook, President; F. Rowan, Vice-President; Walter Dean, Treasurer; C. D. Martin, Secretrary. All are of Anniston, Ala.

Astoria & South Coast.—The officers of this Oregon Company are: President, John A. Devlin, Astoria, Ore.; First Vice-President, Hon. Judge F. J. Taylor, Astoria; Second Vice-President, Daniel K. Warren, Skipanon, Clatsop Co., Ore.; Treasurer, I. W. Case, Astoria; Secretary, E. C. Holden, Astoria, and Chief Engineer and Superintendent, Henry B. Thielsen of Astoria.

Atlantic Coast Line.—E. C. Dunn having resigned to accept a position on another system, M. W. Divine has been appointed Assistant Engineer, with headquarters at Wilmington, N. C. S. A. Johnson has been appointed Roadmaster of the Southern Division of the Wilmington & Weldon, with headquarters at Wilmington. His territory will be from Wilmington to the 110-mile post, and the Clinton & Warsaw Branch, vice G. B. Newcomb, who has been transferred to the Northeastern of South Carolina, with headquarters at Florence, S. C. J. W. Sing has been transferred from the Northeastern of South Carolina to the Northern Division of the Wilmington & Weldon, with headquarters at Wilson, N. C. His territory will be from the 110-mile post to Weldon, N. C., the Wilson & Fayetteville Branch, and Midland North Carolina road. J. M. Fitzgerald has been appointed Roadmaster of the Branch Road Division, with headquarters at Rocky Mount. This division will consist of the Scotland Neck, Nashville and Tarboro branches, and the Albemarle & Raleigh road.

Baltimore Belt.—The following officers have been chosen: William Gilmor, President; C. F. Kerchner, Secretary and Treasurer, and Richard Randolph, Chief Engineer. The office is at Baltimore.

Bells Gap.—E. M. Steck, General Passenger and Freight Agent, has been appointed General Auditor of the company.

Buffalo & Geneva.—The first board of directors of the New York company is as follows: Wilson S. Bissell, Frank H. Goodyear, J. Wesley Bridgman, Howard H. Baker, Arthur D. Bissell, Franklin Lee and George J. Sicard, of Buffalo, N. Y.; Howard Elmer, Waverly, N. Y.; William W. Wright and Joseph S. Lewis, of Geneva, N. Y.; M. A. Wilbur, of Victor, N. Y.; S. D. Jackson, Clifton Springs, N. Y., and J. R. Pratt, Manchester, N. Y.

Camden & Atlantic.—At the annual meeting in Camden, N. J., Feb. 28, the following directors and officers were elected: Directors, George B. Roberts, William L. Elkins, Henry D. Welsh, Joseph N. Du Barry, Thomas H. Dudley, Richard D. Barclay, William C. Houston, William Bettle, Edmund E. Read, William C. Dayton, Crawford Miller, Enoch A. Doughty and John B. Hay. The board organized by the election of the following officers: President, George B. Roberts: Vice-President, William J. Sewell; Secretary, D. M. Zimmerman; Treasurer, William Taylor.

Central (New Brunswick).—The officers of this company are: President, C. Ford Stevens, of Philadelphia; Secretary and Treasurer, W. T. Whitehead, Fredericton, N. B.; Chief Engineer and Manager, Thomas M. Williamson, Chipman, N. B.

Charleston & Savannah.—The old officers of the company were re-elected at the annual meeting held in Charleston, S. C., March 4.

Chattanooga, Cleveland & Murphy.—The officers of this road are: President, E. Watkins, of Chattanooga, Tenn.; Vice-President, C. L. Hordwick; Secretary and Treasurer, W. G. McAdoo.

Chicago, Burlington & Northern.—J. C. Howard has been appointed Assistant Superintendent at Minneapolis, in place of J. R. Hastings, promoted. Mr. Howard is also General Agent of the Freight Department at the same point.

Chicago, Kansas & Nebraska.—George F. Wilson has been appointed Assistant General Master Mechanic and Master Car-Builder of the road, with headquarters at Horton, Kan.

Chicago, Rock Island & Pacific.—William M. Brewer has been appointed Assistant Traveling Auditor of the road, vice Samuel Matthews, assigned to other duties.

Chicago, Santa Fe & California.—R. H. Emerson, Master Mechanic of the Kansas City Division, having resigned, the jurisdiction of M. J. Rogers, Master Mechanic at Chicago, is extended from Chicago to Kansas City, with headquarters at Fort Madison, Iowa, taking effect March 1.

Cincinnati Circular.—This new Ohio company has been organized by the election of the following directors: Charles Schiff, Henry Lewis, Thomas Paxton, Samuel Hunt and Ralph Peters. The directors organized by the election of Henry Lewis, President, and H. H. Tatem, Secretary.

Cincinnati, Washington & Baltimore.—T. J. Scully has been appointed Train Dispatcher of the Portsmouth Division, with headquarters at Hamden, O.

Cleveland & Canton.—W. O. Chapman has been appointed Secretary of the road with office at Boston, Mass., in place of D. K. Stevens, resigned. Mr. Chapman is also Vice-President and Treasurer.

Cleveland, Columbus, Cincinnati & Indianapolis.—The following were this week elected directors for three years: Benjamin S. Brown, A. G. Dulman, W. Bayard Cutting and Charles F. Cox.

George S. Russell was elected Treasurer, and J. T. Wann Secretary of the company.

Cleveland, St. Louis & Kansas City.—The following are now the officers of this road: President, T. C. Clarke, 1 Broadway, New York; Vice-President, F. C. Hollins, 11 Wall street, New York; Chief Engineer and General Manager, J. F. K. Hayward, Roe Building, St. Louis. The following is the Executive Committee: T. C. Clarke, James Roosevelt, F. C. Hollins and E. C. Gregory.

Columbia & Puget Sound.—F. A. Hill has been appointed Assistant Superintendent and Traffic Manager, with headquarters at Seattle, Wash. Ter., in place of T. J. Milner, resigned.

Coshocton & Southern.—J. W. Wardwell has been elected Superintendent. Mr. Wardwell is Superintendent of the Cleveland & Canton.

Dallas, Pacific & Southeastern.—The following directors have been elected: J. E. Henderson, President; H. M. McLaurin, Vice-President; W. H. Flippin, Treasurer; J. P. Murphy, Secretary; J. N. Simpson, B. Blankenship, J. C. O'Conner, D. H. Morrow, and A. Sanger. The general office will be at Dallas, Tex.

Decatur & South Mountain Belt.—The following officers have been elected: A. C. Frey, President; R. W. Austin, General Manager, and T. G. Macey, Engineer. The general office is at Decatur, Ala.

Des Moines & Northwestern.—A. N. Denman is now Managing Director of this company, with office at Des Moines, Ia.

East Tennessee, Virginia & Georgia.—E. B. Parke has been chosen Acting Superintendent of Transportation, with office at Knoxville, Tenn., to succeed J. A. Phillips, resigned.

Fairhaven & Southern.—The following officers have been elected: Nelson Bennett, President; E. M. Wilson, Vice-President, both of Tacoma, W. T.; C. X. Larrabee, Treasurer; E. L. Cowgill, Secretary and General Manager, with office at Fairhaven, Whatcom County, W. T.

Florida Railway & Navigation Co.—D. E. Maxwell, formerly General Superintendent, has been appointed General Mrnager, the former office having been abolished. He has also assumed the duties of Purchasing Agent until further notice, vice R. S. Lukenbill, deceased.

Fort Worth & Rio Grande.—C. C. Wickes has been elected Vice-President, with office at Fort Worth.

Richard Lord has been appointed General Freight and Passenger Agent, with office at Fort Worth, Tex.

Fremont, Elkhorn & Missouri Valley.—W. P. McFarlane has been appointed Superintendent of Telegraph, in place of E. C. Harris, with headquarters at Missouri Valley, Ia.

Humeston & Shenandoah.—H. S. Nelson has been appointed General Freight and Passenger Agent, with headquarters at Clarinda, Ia.

Illinois Railroad & Warehouse Commission.—John R. Wheeler, of Chicago, Isaac N. Phillips, of Bloomington, and W. L. Crim, of Frankford, have been appointed to serve as State Railroad and Warehouse Commissioners in place of the present members of the board whose terms of service have expired.

Indiana, Illinois & Iowa.—J. A. Drake has been appointed Secretary and Treasurer, with office at Kankakee, Ill., to succeed E. Fletcher.

International & Great Northern.—J. M. Eddy of Sedalia, Mo., has been elected President, to succeed Jay Gould, who also resigns as a director. Russell Sage has also resigned from the board of directors.

Lampasas, Burnet & Southwestern.—The following are the incorporators of this Texas road: J. H. Galbraith, E. M. Longcape, T. L. Cauthon, John Manward, J. W. Townsend, W. A. Patterson, William Gennett and J. C. Matthews, all of Lampasas.

Leesburg & Lake Region.—The following officers have been chosen: President, J. F. Richmond, Okahumpka, Fla.; Treasurer, G. C. Staypleton, Leesburg, Fla.; Chief Engineer, C. S. Noble, Mt. Claire, Fla. The principal office of the company is at Leesburg.

Lehigh Valley.—F. J. Krom has been appointed Assistant General Car Agent, with office at Sayre, Pa. In addition to his present duties, he will have entire charge of the distribution of cars on the Northern Division.

Memphis, Little Rock & Indian Territory.—The following officers have been elected: Gustave A. T. Milair, President; B. E. Orr, Vice-President and General Manager; F. F. Smith, Secretary; J. B. Conkling, Treasurer, and H. A. Schwanecke, Chief Engineer. The general office is at 212 Allis Block, Little Rock, Ark.

Mexican Central.—Robert Burgess has been appointed Resident Engineer on the San Luis Potosi Division of the Mexican Central with headquarters at Aguas Calientes, Mexico.

Milwaukee, Lake Shore & Western.—Ernest Vliet has been appointed Acting General Passenger Agent, with office in Milwaukee, Wis., to succeed George S. Marsh, resigned to accept service with another company.

Minneapolis & St. Louis.—George F. Wilson, having resigned the position of Master Mechanic to accept service with another company, W. H. Whittaker has been appointed Acting Master Mechanic.

New York, Ontario & Western.—F. W. Smith has been appointed General Baggage Agent, with office at Weehawken, N. J., vice J. R. Naylor, resigned.

New York, Susquehanna & Western.—The annual meeting of the stockholders of the company was held at Jersey City Feb. 28, and the following directors were elected: Charles M. Heald, Stephen V. White, Simon Borg, Robert K. Dow, James M. Hartshorne, Henry Marks, Frank C. Lawrence, Jr., Alfred Sully, Charles Minzesheimer, Henry Sanford, John I. Blair, Garrett A. Hobart and Charles Siedler. The directors organized by electing Charles M. Heald, President; Stephen V. White, Vice-President; Simon Borg, Second Vice-President, and J. P. Rafferty, Secretary and Treasurer.

Northern Central.—The stockholders of the road held their annual meeting in Baltimore, Feb. 28, and elected these directors: George B. Roberts, Wistar Morris, George Small, J. N. Hutchinson, B. F. Newcomer, John P. Green, Harry Walters, Henry James, J. N. Du Barry, Louis W. Hall, E. B. Parsons, J. D. Cameron. George B. Roberts was re-elected President. The others elected were Frank Thomson, Vice-President; Stephen W. White, Secretary, and John Sheib, Treasurer. Mr. Roberts resigned as a director, and A. J. Cassatt was elected in his place.

Old Colony.—John C. Sanborn has been appointed General Train Master, and in addition to his other duties will have charge of all train men on the Central, Cape Cod, and Providence divisions, with headquarters at Kneeland Street Station, Boston. The office of Passenger Transportation Master has been abolished.

Petaluma, Sebastopol & Russian River.—This company has been incorporated in California, with the following as directors: J. A. McNear, I. G. Wickersham, A. L. Whitney, William Pearlman, William Hill, H. T. Fairbanks, E. Denman, George C. Codding, J. L. Dinnide, all of Petaluma, and Aaron Barnes and James Gannon, of Sebastopol.

The following officers have been elected: John A. McNear, President; W. B. Haskell, Secretary, and H. B. Higbee, Treasurer.

Pittsburgh, Shenango & Lake Erie.—W. H. Garrett has been appointed Acting General Freight Agent, with office at Greenville, Pa. The office of Purchasing Agent has been created, and J. C. Grove appointed Purchasing Agent, with office at Greeville, Pa.

St. Charles & Helena.—The incorporators of this Arkansas company are J. H. McCarthy, J. R. Campbell, W. H. Bradford, G. W. Shinn, J. M. Moore and H. J. Campbell.

St. Louis Bridge & Tunnel Co.—The company elected the following directors this week: Julius S. Walsh, Thomas E. Tutt, Edward Walsh, Jr., William Taussig and J. Pierpont Morgan.

Savannah, Florida & Western.—The following directors were chosen this week: H. B. Plant, W. S. Chisholm, H. S. Haines, J. H. Estil, M. K. Jesup, Henry Sanford, and M. J. O'Brien.

Southwest Pennsylvania.—The stockholders of the company held their annual meeting March 5 and elected the following directors: J. N. Du Barry, President; John K. Ewing, John P. Green, William J. Howard, George F. Huff, Wistar Morris, William A. Patton, Robert Pitcairn, George B. Roberts, N. Parker Shortridge, George A. Torrence, Henry D. Welsh, J. F. Wentling.

Texas & Pacific.—The following directors were elected in New York, March 6, 198,015 shares voting. Jay Gould, Samuel Sloan, John T. Terry, Henry G. Marquand, Samuel Thomas, George J. Gould, Thomas J. Eckart, Russell Sage, C. M. McGhee, C. E. Satterlee, A. L. Hopkins, New York; Isaac J. Wistar, J. N. Hutchinson, Philadelphia; E. B. Wheelock, New Orleans; Milton H. Smith, Louisville; S. H. H. Clarke, St. Louis, and John C. Brown, Dallas, Tex.

W. J. Doyle has been appointed Roadmaster of the Rio Grande division, with office at Weatherford, Tex., to succeed W. J. Carnahan, resigned.

Toledo, St. Louis & Kansas City.—John R. Fulton has been appointed Assistant Engineer.

Ultima Thule, Arkadelphia & Mississippi.—The following officers have been elected: William Grayson, President, St. Louis, Mo.; L. Werner, Vice-President, St. Louis, Mo.; O. G. Schulenburg, Secretary and Treasurer, St. Louis, Mo.; F. W. Swift, General Traffic Manager, Arkadelphia, Ark.; J. F. Miles, Master Mechanic, Arkadelphia, Ark.

Union Pacific.—John R. Manchester has been appointed General Claim Agent of the Law and Operating Departments and will report to the General Attorney. His headquarters will be at Omaha, Neb.

West Jersey.—At the annual meeting of the stockholders of the road held in Camden, N. J., March 5, the following board of directors was elected: George B. Roberts, C. F. Leaming, John M. Moore, Thomas H. Dudley, George Wood, J. N. Du Barry, N. P. Shortridge, Henry D. Welsh, W. J. Sewell, Benjamin F. Lee, Samuel H. Nixon, Josiah Wistar, David B. Gill, B. B. Comegys and William G. Nixon. The board organized by the election of George B. Roberts, President; W. J. Sewell, Vice-President, and William Taylor, Secretary and Treasurer.

West Jersey & Atlantic.—The following directors were elected this week: George Wood, W. J. Sewell, Aaron Fries, Malin Hutchinson, Samuel B. Lewis, Benjamin Lee, John M. Moore, W. J. Scull, Walter Wood, J. N. Du Barry, Israel S. Adams, John S. Gardner, N. P. Shortridge. George Wood was elected President, W. J. Sewell Vice-President, and William Taylor Secretary and Treasurer.

Weston & Elk River.—The incorporators are Hon. J. N. Camden, of Parkersburg, W. Va.; M. W. Hansen, John Brannon, N. B. Newton, and W. L. Dunnington, of Weston, W. Va.

OLD AND NEW ROADS.

New Companies Organized.—Buffalo & Geneva.—Cincinnati Circular.—Dallas, Pacific & Southeastern.—Georgetown & Milford.—Lampasas, Burnet & Southwestern—Rutledge & Julian.—St. Charles & Helena.—Weston & Elk River.

Addyston & Ohio River.—This company, recently incorporated in Ohio, proposes to build a road from Cincinnati to North Bend, Ohio, passing in and through the County of Hamilton, with a branch from Addyston, on the main line, in Miami township, in the County of Hamilton, to a point in the same township, on the north bank of the Ohio River, south of Addyston. The capital stock is placed at $50,000.

Alabama Midland.—The road from Bainbridge, Ga., west to the Chattahoochee River, is now completed ready for tracklaying, which has already been commenced. The line from Bainbridge, on the Savannah, Florida & Western, to Ozark, Ala., 86 miles, will be all graded by May 1. In Alabama the road will pass through Gordon, Dothan, Newton, Ozark, Brundige, Troy and Ada, and thence to Montgomery. The Northwest & Florida road is now controlled by the Alabama Midland, and over it this road will reach Montgomery, making connection at Ada, 20 miles south of that city. The Northwest & Florida extends from Montgomery south to Luverne, Ala., 51 miles. It is 3-ft. gauge, but will be changed to standard. The Alabama Midland will be 175 miles long, and of this all but 30 miles have been located, and the final survey is now being made on this section. Work is in progress on 125 miles of the line, and will commence on the remaining 50 as soon as soon as the location is all finished. The rails used weigh 60 lbs. and enough have been received to equip 50 miles. Four locomotives and a number of freight cars have also been received. The bridges over the Chattachoohee and Flint Rivers are now being erected by the Atlanta Bridge & Iron Works of Atlanta, Ga. Other considerable bridges will be built over the Choctawhatchee, Pea, and Connecuh Rivers. The general contract for building the road has beeen let to J. M. Brown & Co., of 145 Broadway, New York, and they have sublet it as follows: to Louis McLain & Co. for grading; Wilkins & Co. for trestling: Atlanta Bridge & Axle Co. for iron bridges; Lytle & Co. for cross-ties, and H. C. Griffin for track laying. Arthur Pou is Chief Engineer and C. M. Craig is Principal Assistant Engineer. The office at present is at Bainbridge.

Alberta & Athabaska.—This company is asking power to change its name to the Great Northwestern, with power to extend its line to some point north of the Red Deer River, in a northerly direction to the Peace River, at or near Dunvegan, and also south to the international boundary. At least 100 miles of the line north toward Edmonton, Ont., from its junction with the Canadian Pacific are to be completed by Aug. 1, 1890, and to Edmonton by Aug. 1, 1891. The line south to the international boundary is to be completed by August, 1892. The company asks for power to bond its road for $25,000 per mile.

Alberta & Montana.—This company is applying for a charter to build a road from Calgary, Alberta, southerly, via Fish Creek, to the town of Fort McLeod, thence southerly crossing the Kootenay and Milk rivers to the international boundary line. The capital stock is $2,000,000, and power to bond the line at $15,000 per mile is given.

American Midland.—Richard Clegg & Co. have the contract for building the road from Fort Wayne, Ind., to Akron, O. The road is graded from Ottawa, O., west to Fort Wayne, Ind., and upon this part of the line tracklaying will soon begin.

Apopka & Clay Springs.—This is a short Florida road, which is to run from Apopka northeast to Clay Springs. R. C. Waters, of Apopka, has the contract for grading, and about half of the work is now completed. The road is being built by the Pierce & Torry Investment Co., of Orlando, Fla.

Astoria & South Coast.—A contract for grubbing, clearing and grading ten miles of this Oregon road on Clatsop Plains has been awarded to the Portland Macadamizing & Paving Co., of Portland, Ore., and work will soon commence. A contract for grubbing and clearing 60 ft. in width for one mile through a swamp known as the "Skipanon Woods" was let last November to E. Lund & Co. This work has been finished, and surveys have been completed and right of way secured for that section of the road from Astoria, Ore., south to Seaside, 18 miles, and it is expected to complete this part of the line this year. Surveys beyond Seaside will not be made until the road is completed to that point. The road, as projected, is to extend from Astoria, crossing Young's Bay and following the south coast shore of the Pacific through the dairy and farming settlement on Clatsop Plains to Seaside, a summer sea bathing resort at the southern extremity of Clatsop Plains; from thence through the lower Nehalem Valley, tapping an extensive forest estimated to contain not less than six billions of feet of merchantable lumber; thence through the Tillamook Valley to Tillamook Bay. Tillamook County is famed for its adaptation to stock raising and dairying purposes, and its rich lumber resources. From Tillamook Bay the proposed road runs in a southeasterly direction, and will tap the Willamette Valley probably either at Salem or Albany, the intention being to connect the Astoria & South Coast with one of the existing lines. E. C. Holden, of Astoria, is Secretary, and H. B. Thielson is Chief Engineer.

Atlanta & Florida.—This company has, it is stated, been offered extensive timber lands in Florida by Hamilton Disston, to extend its road from its present southern terminus, at Fort Valley, to Tampa, Fla.

Atlantic & Danville.—The grading has been finished on about 20 miles of road between Lawrenceville and Danville, Va., 110 miles, and tracklaying will commence at Danville about March 15. The Danville Construction Co. has the contract for building this line. Work is also in progress on the line from Danville west to Clarkesville, Va. An extension of the main line from Belfield, west to Edgerton, Va., has just been opened for business.

Baltimore Belt.—Surveys have just been completed between tide-water on the southwest and tide-water on the southeast of Baltimore, Md. Estimates are now being made.

Birmingham Mineral.—J. W. Worthington, of Birmingham, Ala., has been awarded a contract for a short extension of this Louisville & Nashville line from Gate City through Red Gap to Grace, in Jefferson County.

Buffalo & Geneva.—The company has filed articles of incorporation in New York to construct a road commencing at the northerly terminus of the Geneva, Ithaca & Sayre road at or near the village of Geneva, and thence by the most direct and feasible route to the city of Buffalo and thence to Suspension Bridge. The length of the road will be 125 miles, and it will pass through and into the counties of Seneca, Ontario, Monroe, Livingston, Genesee, Erie and Niagara. The amount of the capital stock is to be $1,400,000.

Camden & Atlantic.—The project for the extension of the Philadelphia, Marlton & Medford, from Medford to Manahawkin and Long Beach, N. J., about 35 miles, has progressed so far that it is stated contracts will be let this month for building the line, but the construction of the line will not commence until fall.

Canadian Pacific.—Work on the Ontario & Quebec extension from the present terminus at London, through Chatham, in the most direct course to the Detroit River at Windsor, Ont., 112 miles, is making rapid progress, and it is expected to open the line for traffic by next winter. Surveys have been all completed, right of way purchased and contracts entered into for the grading, masonry, iron superstructures, trestle and culvert material, ties, etc., required for the whole section. The contractors for grading are Sinclair & Doheny, of Chatham, Ont.; William Brown, Chatham; Hutchinson & Hicks, of St. Catharines; Campbell & MacBeth, of Strathroy, and M. J. Griffin, of Detroit. For masonry: John Corey & Co., of London, Ont.; William Gibson, of Beamsville, and David Chalmers, of Owen Sound. The large car ferry for use on the Detroit River is being built at Owen Sound by Messrs. Polson & Co., of Toronto, under the supervision of Mr. Henry Beatty, Manager of the Canadian Pacific Steamship Service. William F. Jennings, of Toronto, Ont., is the Engineer.

Carthage & Adirondack.—The company has opened for business the extension from Jayville west 10 miles to a point called Oxwegatchie, N. Y.

Central (New Brunswick).—The Northern division of this road from Norton Station on the Intercolonial, north to Chipman, New Brunswick, on the Salmon River, a distance of 44 miles, has been completed for a distance of 33 miles, and it is expected to have the whole division open for business by June 1. A line is now being located from the head of Grand Lake, near Chipman, westerly to Fredericton, about 40 miles, and the contracts for this line will probably be soon let. The St. Martins & Upham road, extending from Quaco, on the Bay of Fundy, northerly to Hampton, N. B., on the Intercolonial, 33 miles, which is now the southern division of this road, is being relaid with new steel, and thoroughly ballasted. Thomas M. Williamson, of Chipman, Queens County, N. B., is Chief Engineer and Manager.

Charleston, Cincinnati & Chicago.—McDonald, Shea & Co., of Knoxville, Tenn., who have the general contract for the line from Rutherfordton, N. C., to Johnson City, Tenn., and Minneapolis, Va., have sublet sections to A. R. Wing and J. C. Sullivan, of Johnson City, Tenn. The surveys of the uncompleted portion of the road, from Rutherfordton to Whitehouse, Ky., have been nearly all completed. Thomas E. Matson, of Johnson City, is Chief Engineer.

Chattanooga, Cleveland & Murphy.—Arrangements have been made to provide the funds to build this road, and it is expected to let contracts for building the line from Cleveland, Tenn., to Murphy, N. C., about April 1. The survey has been finished for the entire line. E. Watkins, of Chattanooga, Tenn., is President.

Chicago, Kansas & Texas.—The preliminary survey for this road has been completed from Kansas City, Mo., north for about 30 miles, and of this, 10 miles has been located. The contract for grading this 10 miles has been let to Creech, Lee & Kenefick, of Kansas City, Mo. W. E. Winner is President and James R. Chapman, of 123 West Sixth steeet, Kansas City, is Chief Engineer.

Cincinnati Circular.—This is the name of the company referred to last week, which has been organized at Cincinnati to build a double-track railroad around the north side of that city from Red Bank to the West End, connecting all East and West End roads. This line will be about 10 miles long, and its location is approximately a semi-circle around the north side of the city. No surveys have yet been made, but the grades will not be heavier than 52 ft. to the mile. From its West End terminus, near Sedamsville, into the Little Miami Depot will be 17 miles, and from the East End terminus, near Red Bank, the distance will be a little less into the Central Union Depot; but its own track will be about 10 miles long. The capital stock is $100,000.

Cleveland, St. Louis & Kansas City.—The location for the bridge piers for the great bridge which it is proposed to build across the Mississippi River at Alton, is now being made. The contract for this bridge has been let to William Baird & Co., of 35 Broadway, New York. It is also proposed to build a bridge over the Missouri River. The road will extend west from Alton to St. Charles, Mo., and thence west through the counties of St. Charles, Warren, Callaway and Boone to Boonville, Mo. Most of this line is under contract. Fifty miles of the line have been graded, and 10 miles of track have been laid west from St. Charles. T. C. Clarke, of 1 Broadway, New York, is President.

Dallas, Pacific & Southeastern.—This company has been organized to succeed to the charter of the Dallas, Archer & Pacific, which was to extend from Dallas northwest to Archer, Texas. The contract for building 90 miles of the road between Fort Worth and Archer is said to have been let to Burnett & Murphy, of Palestine, and Burns & Peters, of Dallas. It is stated also that $125,000 has been secured to build this section, and besides this, the company is endeavoring to raise $50,000 at Dallas as a subsidy. Preliminary surveys have been made, and the location will soon be commenced.

Decatur & South Mountain Belt.—It is expected to begin work on this line within 60 days and complete it this year. It will be 12 miles long and extend through iron ore beds and stone quarry and timber tracts near Decatur. An issue of $100,000 bonds has been subscribed in New York. R. W. Austin is General Manager.

Dover & Statesboro.—This company proposes to construct a road from Dover, south about 15 miles to Statesboro, Bullock County, Ga. F. Lockhart, of Augusta, Ga., is one of the projectors.

Evansville, Fort Wayne & Chicago.—The contract for grading and bridging 109 miles of this road between Evansville and Lafayette, referred to last week, has been awarded to the Keene Brothers Construction Co., 611 North Main street, St. Louis, Mo.

Fairhaven & Southern.—This road starts at Fairhaven, a point on Bellingham Bay, two miles south of Whatcom, Wash., and will be extended south to the Skagit River, a distance of 30 miles, during the present year. It is not intended at present to extend it further during the present season, but it will undoubtedly be extended from there across the mountains to eastern Washington, as well as south, to connect with the Northern Pacific. The survey of the line to the Skagit River is already made, and most of the location completed. Some of the contracts are let, and a good deal of the right of way has been cleared, all of which in that country is very heavily timbered. The road passes through a very heavily timbered country, skirts the base of the Cascade Range, in which are large coal veins, great quantities of hematite iron ore, as well as various other minerals, common in that section of the country. The prospect of the earning capacity of this road is flattering; the company consists of individuals who have already subscribed funds for the completion of the work, so far as above outlined, without the issue of bonds or other securities. The same individuals own large tracts of coal lands and fine timber lands, which of themselves will assure traffic sufficient to justify the building of the road. It will also form an important link between the Central Pacific and the Northern Pacific, the Union Pacific and other roads coming from the south through Portland to Puget Sound. The officers are given in another column.

Georgetown & Milford.—A bill has been introduced in the Delaware Legislature to charter this company to build a road from Georgetown, on the Philadelphia, Wilmington & Baltimore, northeast through Milton to Drawbridge, in Sussex County, about 10 miles. Among the projectors are ex-Governor Stockley, Senator Dorman, John R. Paynter and others.

Georgia Pacific.—The lease of the Starkville and Columbus branch of this road to the Georgia Pacific, made in December, 1885, will terminate March 10, when the Mobile & Ohio will assume control of and operate the branch for its own benefit.

Georgia Southern & Florida.—The contract for building the extension south from Valdosta, Ga., to Lake City, Fla., is said to have been let to Morgan & Reynolds.

Hartsville.—It is stated that arrangements have been made for building this 10 mile South Carolina road, of which J. L. Coker, of Hartsville, is President.

Henderson State Line.—Ohio County, Ky., has made the company an offer of $60,000 if it will so change its proposed line as to pass through Centertown and other Ohio County towns, and the matter is under consideration. Warren County, Ky., last Saturday voted this road a subscription of $150,000.

International & Great Northern.—Suit was entered against this road and the Missouri, Kansas & Texas on March 1 in the District Court at Palestine, Tex. The petition alleges that this company has unlawfully consolidated its stock with that of the Missouri, Kansas & Texas, and issued to it the controlling interest of its stock; that for the purpose of carrying the consolidation into effect it procured the appointment of Receivers, and that the order appointing the Receivers is null for the reason that the court had no jurisdiction. The plaintiff then asked for the appointment of Receivers to operate the road in conformity with the laws of the state; that the act of consolidation between the roads be declared null, and the stock issued to the Missouri, Kansas & Texas be cancelled, and that the latter road be enjoined from voting stock at the stockholders' meeting in April next, and that T. B. Bonner and N. W. Finley be enjoined from acting as Receivers.

Keokuk & Northwestern.—The road was sold in Keokuk, Ia., March 1, to Charles E. Perkins, for $734,336, under an order of the court in the case of A. B. Stone against the Keokuk & Northwestern and St. Louis, Keokuk & Northwestern roads.

Lampasas, Burnet & Southwestern.—This company has been incorporated in Texas to build the road from Lampasas through the counties of Lampasas and Burnet to a connection with the Austin & Northwestern, at some point in Burnet County, a distance of 21 miles, the main office to be at Lampasas. The capital stock is $100,000.

Louisville, Hardinsburg & Western.—The final survey of this line has been begun at Irvington, Ky., and construction will probably begin at once.

Louisville, St. Louis & Texas.—President McCracken announces that the bridge at Spottsville, Ky., wrecked some time ago, just as the road was about to be opened, will be finished this week, and that the line will be open without transfer between Louisville, Ky., and Henderson, Ky.

Manhattan.—The Executive Committee this week declared a quarterly dividend of 1¼ per cent., payable in scrip, convertible into new four per cent. bonds. The terms and amount of the proposed issue of bonds were not made known. It was said, however, that the purpose was to consolidate all the mortgages and other obligations into a general four per cent. bond. The issue would include all outstanding indebtedness, land damages and possible extensions. The mortgage would be for 100 years, but the amount could not be fixed until the land damages at least were arranged.

Marquette, Iron Range & Chicago.—The survey is reported in progress for a new road from Marquette, Mich., to the iron mines, connecting at Champion with the Milwaukee & Northern. It will be about 40 miles long.

Memphis Little Rock & Indian Territory.—The location for this road, which is to be constructed from Little Rock to Hot Springs, Ark., and thence west to the Indian Territory line, has been nearly completed, and contracts have been let for completing the line. A few months ago work was commenced on the line near Little Rock, but was suspended shortly, and will not be resumed until the contractors arrive. The officers are given on another column.

Meridian & Tuscahoma.—The preliminary survey of the line has been finished from Meridian, Miss., to a point in Alabama on the Tombigbee River.

Middleburg, Highland & Lake Butler.—This road is being built from Middleburg, Clay County, Fla., to a connection with the Florida Railway & Navigation Co.'s line at Highland, and from thence west to Lake Butler in Bradford County. Work on the line is being vigorously pushed, and it is expected to have it completed during April. William Varnedoe, of Highland, Fla., is Superintendent.

Monongahela River.—The stockholders of this company have authorized a mortgage on the proposed road from Clarksburg, in Howard County, to Fairmount, in Marion County, W. Va., a distance of 35 miles. The mortgage is to secure an issue of $700,000 bonds, at the rate of $20,000 a mile, the interest on which is guaranteed by the Baltimore & Ohio. J. A. Fickinger, of Parkersburg, W. Va., is Chief Engineer, and E. W. Clark, Jr., of Philadelphia, is Secretary.

New Roads.—Alfred Dolge, of Dolgeville, N. Y., and George Streetor, of Johnstown, N. Y., are endeavoring to secure local aid for a projected road to extend from Utica or Richfield Springs, via Dolgeville, Johnstown and Gloversville, to Saratoga, N. Y., about 70 miles.

New York City Railroads.—Corporation Counsel Beekman, of New York city, at the request of Mayor Grant, has prepared a bill for immediate introduction in the Legislature, which is intended to provide for the earliest practicable laying out and building of rapid transit railroads for the city. The bill provides for the appointment of five commissioners by the Mayor, who shall organize and sit, within thirty days, and hold sessions without delays or recesses on every working day until their task is accomplished. They are to have complete power to lay out routes for rapid transit in any part of the city. The bill provides that no proceedings on the part of previous commissions or bodies shall be allowed to interfere with the work of the new Commission. When its routes are laid out and its plan of rapid transit is completed, the results of its deliberations are to be submitted to the Sinking Fund Commission. If the Sinking Fund Commissioners approve the plan of the new Rapid Transit Commission, then efforts will be made to get the consent of property owners along the proposed routes. If this cannot be obtained, the Sinking Fund Commissioners themselves will apply to the Supreme Court for the appointment of a commission to condemn property for the use of the new rapid transit lines. If the Sinking Fund Commissioners should not approve the plan submitted to them by the Rapid Transit Commission, then the plan is to be returned to the Rapid Transit Commission for revision and amendment, until the objections of the Sinking Fund Commissioners are met.

New York, Ontario & Western.—The stockholders meeting to authorize a mortgage on the road to secure the new consolidated $10,000,000 five per cent. bonds will be held April 30. It is announced that this money will be expended as follows: $4,400,000 will be due for the retirement of the first mortgage six per cent. 30 year loan for $4,000,000, which is redeemable on six months' notice at 110; $3,500,000 for the proposed extension to Scranton, and $2,100,000 for use as may be required.

Norfolk & Western.—A survey is now in progress for an extension of this line from Ivanhoe, Va., on the Cripple Creek extension, southeast about 45 miles to Mt. Airy, N. C., on the Cape Fear & Yadkin Valley road. The survey for the proposed extension from the Elkhorn Flat Top coal fields to the Ohio River, near Ironton, a distance of 185 miles, is also in progress.

Oregonian.—Justice Miller, of the United States Supreme Court, decided this week that this company had no power to lease its railroad, and that the Oregon Railway & Navigation Company had no power to take the lease, as no such power was granted in the company's charter, and the state laws of Oregon do not grant power to foreign railroad corporations the right to make leases. The Court also holds that the mere fact that the lessor has for three years executed the lease does not compel its continuance for 93 years longer, as specified. The case came up to court on an action at law brought by the Oregonian Co. to recover damages from the Oregon Railway & Navigation Co. for refusal longer to be bound by the provisions of a contract by which it leased the former company.

Paducah, Hickman & Southern.—Paducah, Ky., last Saturday voted a subscription of $60,000 to the capital stock of this road, and it is announced that the work of construction will at once be begun between Paducah, Ky., and Paris, Tenn.

Paducah & Tennessee.—Paducah, Ky., has voted a subscription of $100,000 to the capital stock of this road.

Pennsylvania.—The Pennsylvania, which already has a large water front on the Delaware at Philadelphia, has just purchased extensive additional wharf property opposite Wind Mill Island, which is shortly to be removed. The price is said to have been about $250,000.

Petaluma, Sebastopol & Russian River.—The charter has been filed in California for this company, which, as already noted, proposes to build a road from Petaluma through Sebastapol and Guerneville, in Northern California. The line will be about 26 miles long and the capital stock is $400,000. The principal office will be in Petaluma.

Richmond, Fredericksburg & Potomac.—Proposals are asked until March 15 for the grading, masonry and bridging on eight miles of road near Richmond, Va., to connect the above road with the Richmond & Petersburg. The work includes a high iron bridge over the James River. E. T. D. Myers, Richmond, Va., is General Superintendent.

Rutledge & Julian.—This company has been organized in Alabama for the purpose of constructing and operating a branch road from a point on the Northwest & Florida, near Julian station, to Rutledge, Crenshaw County. The capital

stock of the company is placed at $15,000, and the headquarters will be at Rutledge.

St. Charles.—This company has been incorporated in Arkansas to build a road from St. Charles, in Arkansas County, northeast, about 35 miles, to Helena.

San Antonio & Aransas Pass.—Work on the Llano extension of the road from Comfort via Fredericksburg, Tex., was commenced last week, the necessary bonus of $125,000 having been raised

Savannah, Americus & Montgomery.—The company has let the contract for grading the extension from the eastern terminus of the road at Abbeville, Ga., on the Ocmulgee River, eastward 25 miles to a connection with the East Tennessee, Virginia & Georgia, at McRae, to McLaughlin Bros., of Memphis, Tenn., and Redmond & Radcliffe, of Augusta, Ga. They will begin work about March 15 and have it completed by July 1. The contract for the trestle work has been let to A. R. Coulter, and for the cross ties to Stewart Bros. The contract has not yet been awarded for building the bridge over the Ocmulgee River. This bridge will be a revolving draw span. The company now operates 110 miles of road from Louvale through Americus to Abbeville, and expects to build to Savannah, Ga., and to Montgomery, Ala. Preliminary surveys have been made to Montgomery, to Columbus, Ga., and to Eufaula, Ala., along the Chattahoochee River. R. E. Hardaway, of Americus, Ga., is Superintendent.

Sonora, Sinaloa & Chihuahua.—Grading is expected to begin on this road at Deming, N. Mex., early in July. The line is to be built from Deming to Alamos, and thence to Guaymas, in the state of Sonora, and the stockholders have authorized a mortgage on the road to secure an issue of bonds. John A. Lee, of Albuquerque, N. Mex., is Vice-President

State Line & Oakland.—The survey for this road has just been completed through Friendsville, Md. The line is to extend from Oakland, Garrett County, Md., north to Confluence, Pa. Both points are on the Baltimore & Ohio

Tennessee River & Birmingham.—This company has been chartered in Alabama and will succeed to the right-of-way, road, etc., of the Sheffield & Birmingham Railroad, which was recently placed in the hands of a receiver.

Texas Grand Trunk.—The route of this proposed road has been outlined by T. H. Wilson, of Temple, President of the company, as follows: It is to commence at Vidila, La., and to extend via Hemphill, Homer, Crockett and Centreville, to Waco, thence through Burnet, Fredericksburg, Kerrville and Uvalde to Eagle Pass.

Union Pacific.—The survey for the Carbon Cut-Off road, recently chartered, has been commenced at Carbon, Wyo., under C Harlowe. A survey is also being made from the terminus of the Cheyenne & Northern at Wendover, Wyo., northwest to Douglas, from which point it is thought it will be continued to Buffalo, Johnson County, in the northern part of the territory.

Wabash.—The report of the Master in Chancery filed in court some time ago has been set for hearing March 21. The report relates to the foreclosing of eight different mortgages on the main line and Decatur & East St. Louis Divisions, and it is expected that a decree of sale will be executed. The Chicago Division, from Chicago to Altamont and Effingham, and the Streator Division will not be included in the proceedings. As regards the latter portions of the Wabash a decree of sale was entered at Springfield, Ill., and the properties have been advertised for sale. It is expected that the purchasing committee will assume charge next July. The roads east of the Mississippi River will probably be consolidated with the lines west of the river and placed under one management. The new consolidated company is to execute a first mortgage amounting to $34,000,000, payable in 50 years.

Of this issue of first-mortgage bonds $11,741,000 are to provide for the retirement or exchange of the existing mortgage bonds on the Wabash Western. Of the remainder, $1,000,000 may be used for the acquisition of the Detroit terminal grounds and $808,000 may be sold, if necessary, to repay the money advanced on first-mortgage coupons. The new company is also to execute a second mortgage on its lines east of the Mississippi River to the amount of $14,000,000. Into this the second mortgages and funded debt of same, the consolidated mortgage and its funded debt, and the mortgage 7 per cent. bonds of 1879 are to be convertible.

Weston & Elk River.—This company has been incorporated in West Virginia to build a line from Weston, Lewis County, W. Va., to Sutton, Braxton County, W. Va., and the incorporators announce that they will begin work in a few weeks. Preliminary surveys are now in progress. The offices are at Weston, W. Va.

West Virginia Central & Pittsburgh.—The extension of this road from Thomas Station southwest to Elkins (formerly Leadsville), a distance of 42 miles, is expected to be completed early the coming Summer. It is now completed to Parsons, 13 miles from Thomas, and part of this line is in operation. The company now operates 93 miles of road, the main line extending from Cumberland, Md., to Davis, W. Va. William Porter is Superintendent and James Parson Chief Engineer of this extension, with office at Thomas, W. Va.

Wheeling Railway, Bridge & Terminal Company.—This company is the same corporation, under a new name, as the Wheeling & Harrisburg Railway Co., of West Virginia, which was originally organized as a part of the South Pennsylvania scheme, giving that line an outlet across the northern neck of West Virginia, to and across the Ohio River at Wheeling, West Va. This charter has been taken up by a party of eastern capitalists, in no way connected with any particular railroad company, for the purpose of building a bridge over the Ohio, and terminal facilities in Wheeling, West Va., and Martins Ferry, Ohio, to give ample and equal connections to all lines terminating on either side of the Ohio River at these points. Among those interested in this enterprise are Col. George P. Bissell, Hartford, Conn.; George Ripley, Capt. J. B. Thomas and R. H. Stearns, Boston; Jacob Rogers, Lowell, Mass; Henry E. Russell, L B. Hawes and Charles M. Fry, New York. Col. George P. Bissell is President, with office in Rogers Block, Wheeling, W. Va.

The contract for the grading, tunnel work, masonry, ballasting and tracklaying for the entire line has been let to Paige, Carey & Co., No. 45 Broadway, New York City. The contract for the Ohio River bridge and its approaches has been let to the Edge Moor Bridge Works, of Wilmington, Del., and the Wrought Iron Bridge Co., of Canton, Ohio, has the contract for the bridge over Wheeling Creek, and the other smaller spans and trestles on the lines, all of the work to be completed ready for running trains by Jan. 1, 1890. The line now under construction begins at the Northern line of Martins Ferry city corporation, where connection can be made with the Cleveland, Lorain & Wheeling, the Cleveland & Pittsburgh, the Wheeling & Lake Erie and the Cleveland, Canton & Southern. The line is to be double track from this Northern terminus for about three miles, to the peninsula back of Wheeling City, when a connection can be made with a line to the Connellsville coke regions. The single track line from this point is about three miles long, running down Wheeling Creek and through an 800-ft. tunnel to South Wheeling, where connections can be made with the Baltimore & Ohio, the Ohio River Railway and the Pittsburgh, Wheeling & Kentucky. The entire line will be stone ballasted, laid with 72-lb. rails, and with all stone or steel culverts, bridges and trestles. The Ohio River and the Wheeling Creek bridges will be double track, steel structures, the first having one 525 ft., three 250 ft. and one 150 ft. through spans, with two trusses placed 30 ft. apart on centres and with four lines of steel stringers under each track, and having about 350 ft of deck approaches on steel trestles, in spans of 30 to 110 ft. on each side of river spans; and the Wheeling Creek bridge having two 125 ft. deck spans, with two trusses placed 27 ft. apart, and nine lines of steel stringers under the tracks, and having a 50 ft. deck span over the Wheeling & Elm Grove Railroad. The line has two double-track tunnels, about 700 and 1,200 ft. long respectively, between the Ohio River and Wheeling Creek bridges, and a single-track tunnel about 800 ft. long in South Wheeling, and the whole work, including lands, station houses, and equipment, is estimated to cost about $3,500,000.

Job Abbott, C. E., of 150 Broadway, New York, is Chief Engineer for the company, and H. F. Dunham, C. E., of Cleveland, Ohio, is Engineer-in-charge, with office in Rogers Block, Wheeling, W. Va.; Gilman Bunn, C. E., of Fredericton, New Brunswick, is First Assistant Engineer, and Lee L. Dagron, of Pittsburgh, Pa., is Chief Inspector of Bridges. Work was actively commenced on the line in October last, and has been pushed steadily through the winter. The east abutment and several pedestals for the east approach of the Ohio River bridge have been completed, and stone is being quarried and delivered for all of the masonry. The face-cuts have been made for the 700 and 1,200 ft. tunnels, and headings are being driven at both the north and south ends. A temporary bridge has been completed over Wheeling Creek and the heavy cutting made in the peninsula, and grading is in active progress along the line on Wheeling Creek. The principal street crossings are above or below grade, and there will be only one railroad grade crossing.

Winnipeg & Northern Pacific.—This company has a bill before the Canadian Parliament applying for an amendment to its charter to extend the time for the commencement of construction to three years from Jan. 1, 1889, the company to prosecute work at the rate of not less than 25 miles each year.

TRAFFIC AND EARNINGS.

Traffic Notes.

The numerous fast freight lines working over the Fitchburg Railroad from New England westward have been consolidated so far as to have their Boston agencies placed at one office and in charge of one man.

San Francisco shippers of canned goods are said to have made a shipment of 3,000 tons to New York around Cape Horn. This is in consequence of the refusal of the Transcontinental roads to reduce the rate, and the price by water is said to be 55 cents per 100 lbs.

A Chicago paper states that scalpers are now giving their attention to the sale of tickets at reduced rates to Denver. Through second-class tickets from Chicago to San Francisco, and round-trip tickets to Denver are sold at such rates that single-trip passages to Denver can be made on them, by the usual manipulation, at a considerable reduction. The iron-clad identification provision is allowed to go unenforced.

The Chicago, Burlington & Northern has given notice of its intention to reduce the rate on flour from St. Paul to Chicago on March 18 to 10 cents per 100 lbs, to meet the competition by the Soo Route. The present rate is 12½.

A law has been passed in New York State permitting railroads to collect from passengers paying fare in the cars 10 cents above the present legal rate, the conductor being required to give a rebate check. Trips wholly within the limits of a single city are not covered by the law.

The Chicago, Rock Island & Pacific has presented to the Iowa Railroad Commissioners a detailed statement showing that taking the traffic of 1888 under the then tariff and comparing it with the receipts under the Commissioners' present tariff, the reduction in receipts would be over 27 per cent. The Chicago & Northwestern has shown by a similar statement that the reduction on that road would be 27⅞ per cent.; the Chicago, Burlington & Quincy showed a reduction of 30 per cent.

It is reported that the Burlington & Missouri River makes through rates on grain to Duluth via Omaha and the Chicago, St. Paul, Minneapolis & Omaha road. It is understood that it is made possible to ship considerable quantities of grain by this route in consequence of a reduction of 5 cents per 100 lbs. east of Duluth over the Canadian Pacific in connection with the Duluth, Shore & Atlantic.

Joint Rate Inspection Bureau.

Messrs. Fink, Blanchard, Midgley, and Faithorn, composing the joint rate committee, have issued the rules of the Joint Rate Inspection Bureau, newly organized. The joint rate committee is charged with the duty of preserving "the through rates without evasion, manipulation, or by resort to other devices," and to "put in effect such inspection of billing, etc., as may be necessary."

Pursuant to this authority the committee announces the following organization, appointments and rules of inspection. [We condense the rules.]:

The bureau shall take cognizance of all tonnage interchanged in both directions. It shall be in charge of a Chief Inspector. * * * The chief inspector shall be assisted by traveling and local inspectors.

The chief inspector and his assistants shall be entitled to access to all freight records at all points which their duties may require them to examine. The following are named as inspection stations; it being understood that all junctions not named, which are in competition with those named below, shall be similarly inspected: Dwight, Gardner, Streator, Mazon, Bloomington, Springfield, Decatur, Seneca, Kankakee, North Judson, Knox, Chicago and all Cook County junctions, Peoria, Pekin, Morton Junction, Santa Fe crossing, East St Louis, Alton, Wann, Ashland, Beardstown, Joliet, Matteson, Bloom, E. & J. E. Junction, Gilman, Paxton, Champaign, Arcola, Mattoon, Paris, Terre Haute, Indianapolis, Toledo, Cleveland, Cincinnati, Louisville, Evansville, Cairo, Detroit, Port Huron, Fort Gratiot, Milwaukee.

It shall be the duty of inspectors to determine: That freight is billed at correct classification, weights, rates and divisions. That the points of origin and destination, as shown by the billing, are correct. That freight billed from any junction point as having originated at any point beyond such junction did actually so originate and was shipped directly through from said point. That no change has been made in the consignee or destination of property as originally shipped. This, however, is not to apply when property is stopped in transit at a point of junction and there delivered to consignee and charged at local tariff rate to such junction.

Railroad Earnings.

Earnings of railroad lines for various periods are reported as follows:

ATCHISON, TOPEKA & SANTA FE RAILROAD AND AUXILIARY LINES.

Month of December, 1888: Name of road.	Mileage operated.	Gross earn.	Oper. expenses.	Net earn.
Atchison, Topeka & Santa Fe and leased lines (including Chicago line, St. Joseph, Chicago, Kansas & Western, New Mexico & Arizona and Senora roads	$4,932	$1,799,355	$1,116,918	$682,437
St. Louis, Kansas City & Colorado	61	3,809	5,652	def. 1,843
Gulf, Colorado & Santa Fe	1,058	374,134	280,740	93,394
California Central	269	93,106	86,116	6,990
California Southern	210	83,915	81,486	2,429
Total	$6,531	$2,354,319	$1,570,911	$723,407
Railroads owned jointly with other companies: Atchison Company's one-half	583	171,316	137,873	33,444
Grand total	$7,115	$2,525,636	$1,708,784	$816,851

MICHIGAN RAILROADS.

	1888.	1887.		
Month of December:				
Gross earnings	$6,466,293	$6,821,302	D.	$355,009
Year to Dec. 31:				
Gross earnings	$79,968,117	$80,819,610	D.	$851,492

NORFOLK & WESTERN.

Month of January:	1889.	1888.	Inc. or Dec	
Passen., mail and express	$79,686	$70,876	I.	$8,810
Freight	318,379	309,925	I.	8,454
Gross earnings	$398,065	$380,801	I.	$17,264
Expenses and taxes	287,386	222,166	I.	65,220
Net earnings	$110,678	$158,635	D.	$47,956

PENNSYLVANIA.

Month of January				
Gross earnings	$4,528,744	$4,139,979	I.	$334,765
Oper. expenses	3,447,951	3,188,059	I.	259,873
Net earnings	$1,080,793	$1,005,925	I.	$74,873
Add West. lines	38,943	57,626	I.	18,683
Total net	$1,119,736	$1,063,546	I.	$51,190

CINCINNATI, INDIANAPOLIS, ST. LOUIS & CHICAGO.

Month of January:				
Gross earnings	$231,264	$203,392	I.	$27,872
Oper. expenses	150,776	132,619	I.	18,157
Net earnings	$80,488	$70,773	I.	$9,715

ALLEGHENY VALLEY.

Month of January:				
Gross earnings	$169,069	$155,155	I.	$13,914
Oper. expenses	97,688	87,870	I.	9,818
Net earnings	$71,381	$67,285	I.	$4,095

LOUISVILLE & NASHVILLE.

Month of January:				
Gross earnings	$1,398,847	$1,306,817	I.	$92,030
Oper. expenses	839,144	891,622	D.	52,478
Net earnings	$559,703	$415,195	I.	$144,508
July 1 to Jan. 30:				
Gross earnings	$9,706,103	$9,931,116	D.	$225,013
Oper. expenses	5,931,720	5,995,102	D.	76,698
Net earnings	$3,774,383	$4,936,014	D.	$161,631

Month of January:	1889.	1888.	Inc. or Dec.	P.c.
Allegheny Valley	$169,069	$155,155	I. $13,914	8.9
Net	71,381	67,285	I. 4,096	6.9
Balt. & Potomac	115,701	122,498	D. 6,797	5.8
Net	32,891	47,948	D. 15,057	45.7
Canadian Pacific	897,938	801,205	I. 96,733	12.0
Net	150,963	22,286	I. 128,677	....
Chi., Mil. & St. Paul	1,655,910	1,452,047	I. 203,867	14.0
Net	394,169	93,755	I. 300,414	....
Cin., Ind., St. L. & C.	231,264	204,932	I. 26,332	12.0
Net	80,488	71,236	I. 9,252	12.9
Cleve., Col., Cin. & In.	569,920	574,994	D. 5,074	8.9
Net	110,659	125,930	D. 15,271	13.6
Det., Bay C. & Alp.	38,915	27,805	I. 11,110	39.9
Net	17,902	6,572	I. 11,330	....
Duluth, S. S. & Atl.	97,386	77,050	I. 25,336	26.3
Net	32,016	4,889	I. 27,137	....
Louis. & Nashville	1,398,847	1,306,817	I. 92,030	7.0
Net	559,703	415,155	I. 144,508	34.8
N. Y., Lake E. & W.	1,924,291	1,890,183	I. 34,108	1.8
Net	542,527	532,334	I. 90,193	16.3
Norfolk & Western	398,064	380,801	I. 17,263	4.5
Net	110,679	158,635	D. 47,956	43.3
Northern Central	464,749	452,441	I. 12,308	2.7
Net	149,518	128,247	I. 21,271	16.5
Northern Pacific	1,183,398	703,607	I. 479,791	68.1
Net	339,197	8,466	I. 330,731	....
Pennsylvania	4,528,744	4,193,979	I. 234,947	5.6
Net	1,080,793	1,005,920	I. 74,873	7.4
Petersburg	42,671	38,019	I. 4,652	12.2
Net	20,278	17,365	I. 2,913	16.7
Phila. & Reading	1,616,047	930,240	I. 685,807	73.7
Net	733,614	100,642	I. 622,972	....
P. & R. C. & I. Co.	1,048,952	323,828	I. 716,124	....
Net	def. 153,609	def. 173,655	I. 20,044	13.4
Rich. & Petersburg	24,087	20,004	I. 4,083	20.4
Net	8,492	10,223	D. 1,731	20.3
Staten Island Rap. T.	49,942	42,782	I. 7,160	16.7
Net	def. 4,104	def. 22	D. 4,082	....
West N. Y. & Penn.	247,290	212,759	I. 34,531	16.2
Net	47,395	58,336	D. 10,941	23.0
Total (gross)	$16,699,171	$13,921,124	I. $2,778,047	19.9
Total (net)	4,244,952	2,701,587	I. 1,543,365	57.9

Coal.

The coal and coke tonnage of the Pennsylvania, originating on lines east of Pittsburgh and Erie, for the week ending Feb. 23, and the year to that date, was as follows:

	Coal.	Coke.	Total.
Total for week ending Feb. 23	191,469	78,602	270,069
Total for year 1889 to date	1,591,023	689,683	2,280,706
Total for year 1888 to date	1,816,907	643,501	2,460,408

The anthracite coal tonnage of the Belvidere division of the United Railroads of New Jersey division for the same periods was as follows:

	1889.	1888.	Dec.
For week ending Feb. 23	27,027	31,098	4,071
For the year 1889 to date	200,902	250,450	59,548

Cotton.

The cotton movement for the week ending March 1 is reported as follows in bales:

Interior markets:	1889.	1888.	Inc. or Dec.	P.c.
Receipts	60,965	32,410	I. 28,555	88.1
Shipments	87,538	58,436	I. 29,102	49.9
Stock	270,972	324,588	D. 53,616	19.7
Seaports:				
Receipts	96,593	65,562	I. 31,031	47.3
Exports	131,309	93,396	I. 37,973	40.6
Stock	815,775	821,639	D. 5,864	0.7